

# MODERN Machine Shop

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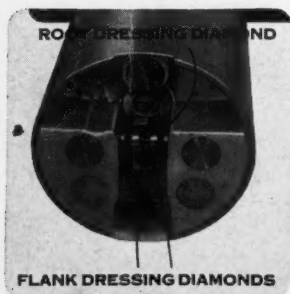
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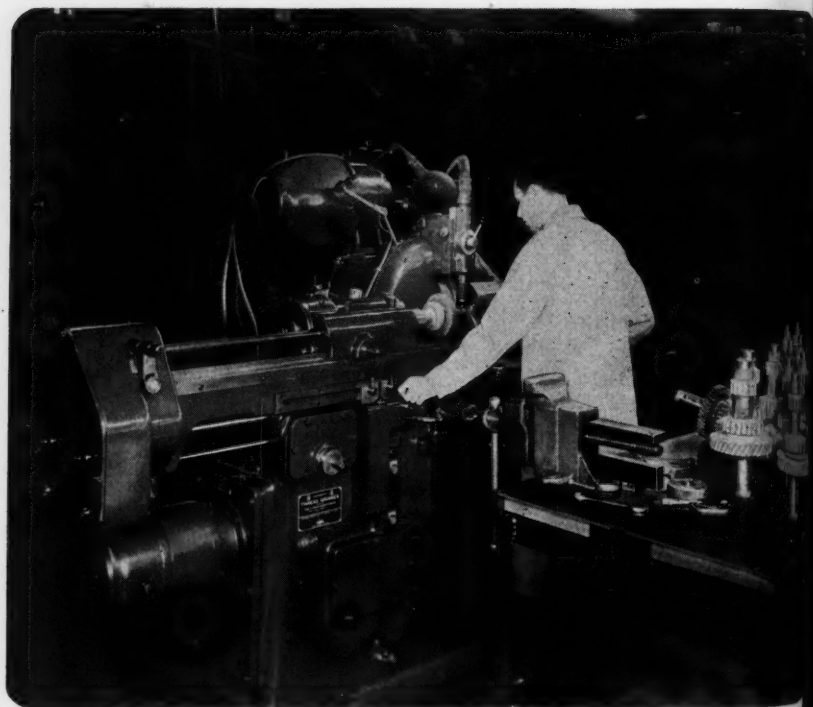
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# MODERN Machine Shop

CINCINNATI, OHIO

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VOL. 11, No. 1

## How Do You Wash Your Metal Parts?

*The washing of metal parts presents a problem for which many plant executives have not yet found the answer. The author of this article offers some helpful suggestions.*

BY EARL W. SOESBE

Engineer, International Conveyor & Washer Corporation, Detroit, Michigan

In the processing of metal parts there are usually points at which parts must be cleaned before they be passed on for assembling or final operation. The simplest method of cleaning is, of course, by washing in a cleaning solution of the kind, but it is not a simple matter to determine how the solution will be applied. Shall the parts be washed, rinsed, or subjected to a combination of the two methods? Must they be dried after washing, and if so what form shall the drying apparatus take? What type of equipment is best suited for parts of a given size, and can the equipment be designed to operate automatically so as to keep costs to the minimum? The fact is that a wide variety of washing machines are now available for washing metal parts, but there are still too many plant executives

who take the stand that "anything will do" when it comes to washing parts. They have the impression that the main thing is to get the parts wet with a solution of some kind in a tank or improvised washing machine in which the bulk of the grease and chips will be removed, depending upon the mechanics on a subsequent operation to finish the cleaning operation.

Much of this lethargy is excusable, perhaps, from the fact that washing has been an inexact process, not only in the operation itself, but also in the results obtained and in the effect of the wash on the performance of the part in actual use. There are seldom any other than visual tests for cleanliness, and it is difficult to trace the failure of a part in use to a poor cleaning job.

Yet washing is one of the few pro-

cesses which, when rightly conceived, cost no more for a good job than for a poor one. The engineer responsible for the purchase and use of this type of equipment cannot do better for his firm or himself than to give careful consideration to the few fundamental factors involved in a good washing job. The greatest forward step is

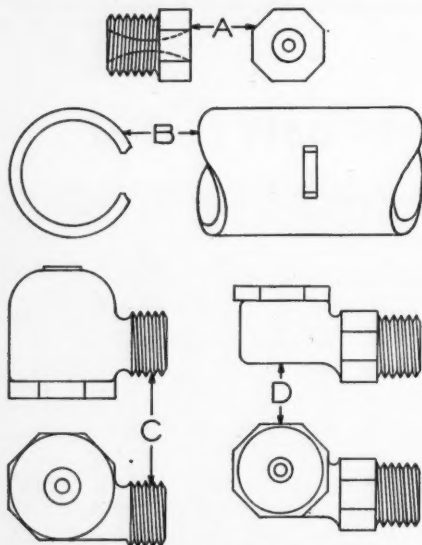


Fig. 1—Types of Nozzles Used on Parts Washing Machine. (a) Venturi Jet. (b) Plain Slotted Pipe. (c) and (d) Nozzles Designed to Deliver Full Spray at Relatively Low Pressures.

made when it is recognized that washing is really an engineering problem, and that all the pertinent facts should be tabulated—at least mentally — before any conclusion is drawn.

Just as all the members and mechanism of a lathe serve the one ultimate purpose of presenting the cutting edge of the tool in the desired relation to the part to be turned, so is the design of an efficient washing machine focused upon the net result of obtaining the impingement of a cleaning fluid, in effective amounts

and in an effective manner, upon the surfaces to be cleaned.

The design of the earlier types of mechanical washers would indicate that the designers took their lessons from nature—the clean appearance of pebbles on the beach; the polish of rocks at the foot of a waterfall; the “washed” look of cobble stones after a hard rainfall. However, the secret of cleaning is the continuous hydraulic action known as “flow”. As simple as it may sound, too much stress cannot be laid upon this point.

Even with the use of the ingenious and highly useful chemical solutions that have been devised to act as solvents for oil, grease, and other extraneous substances, without adequate flow good results are hard to obtain. Not that the use of a good chemical solution is not a necessary adjunct to the successful operation of a parts washing machine; the aid rendered by such a solvent in quickly loosening substances so that the flow will carry them away is unquestionable. However, the details of this phase of the washing problem are beyond the scope of this brief.

A number of methods have been devised to apply water or cleaning solution to the parts to be cleaned. In these, the method finding the greatest range of application, consistency of use, and freedom from trouble in application involves pressure-flow through nozzles. The nozzles are selected so that they direct the flow exactly upon the surface to be cleaned. Good washer design will insure the delivery of clean solution at the right temperature and pressure to the nozzles, although the nozzles exercise the final control.

Now, how must the nozzle be formed? That question can only be answered after an analysis has been made of the parts and surfaces to be cleaned. Some parts require concentrated flow at high pressure; others are best washed with a large volume

water at low pressure; some require a fan-shaped spray, and so on. Although each problem is subject to individual study, nozzle types shown in Fig. 1, when properly applied, have been found to answer most of the problem.

It must be born in mind that by positioning these nozzles in various ways a wide range will be obtained in the performance of each. Also, a combination of two or more types will provide a wide range of flexibility. The first type is the jet shown at Fig. 1. This nozzle is designed from the form known to produce the best characteristics, at full pressure produces a round jet similar to that from the end of a fire hose. This nozzle is ideal for heavy cleaning work where considerable liquid impact is necessary to loosen the dirt to scour the surface. It should be set so that it contacts the surface to be cleaned at an angle; thus the solution will rub the surface and scour it in-

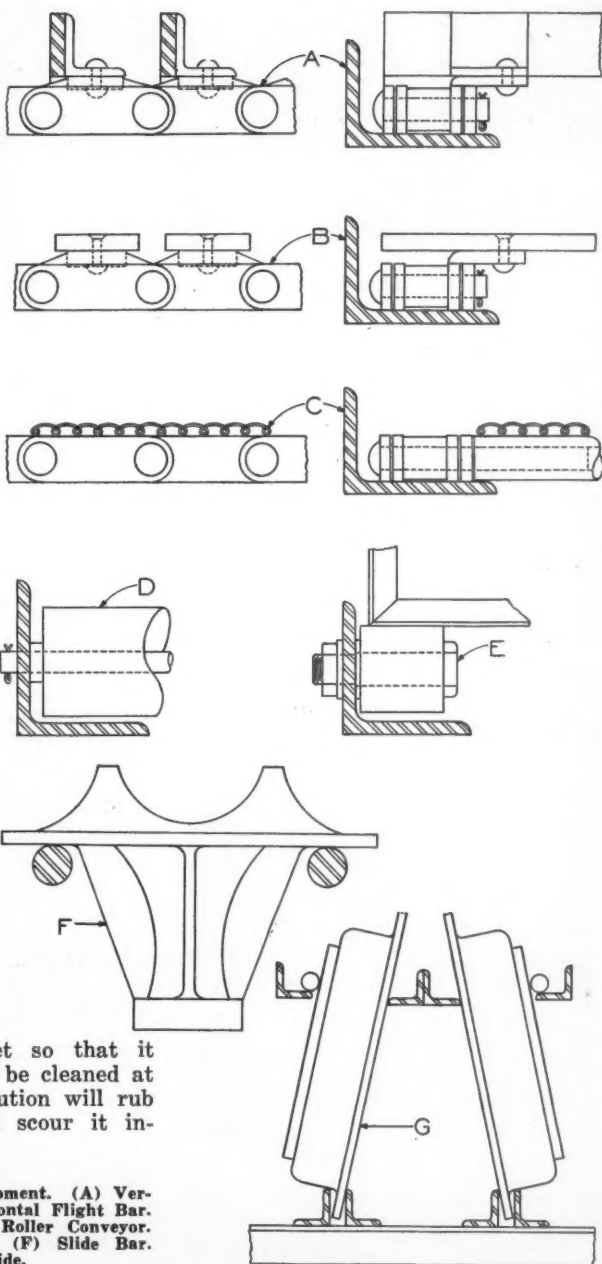


Fig. 1—Parts-Handling Equipment. (A) Vertical Flight Bar. (B) Horizontal Flight Bar. (C) Wire Mesh Belt. (D) Roller Conveyor. (E) Slide Bar. (F) Stub Roller Conveyor. (G) Roller Guide.

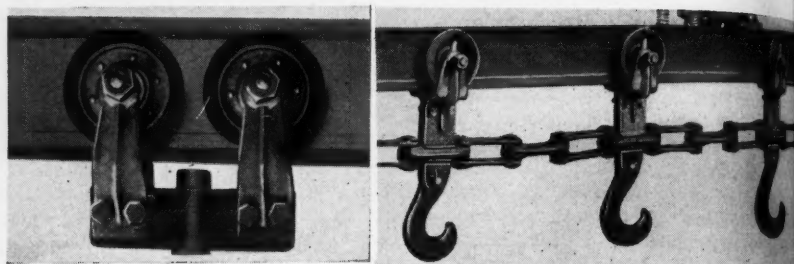


Fig. 2b—(H) Push-Type Tramrail and (I) Power-Driven Monorail Conveyor.

stead of splattering as it would do if it struck straight on.

The correct setting of these nozzles is of first importance. In general, their use is of greatest value in the cleaning of rugged parts of some size where these parts can be made to pass the jets in succession but always in the same position. Examples would include automotive cylinder blocks, rear axle housings, oil pans, transmission cases, and wheels. Similar in use but with poorer flow characteristics is the simple pipe nipple. Its application is about the same as above, but it is not so efficient.

The second type of nozzle, shown at b, Fig. 1, is the plain slotted pipe.

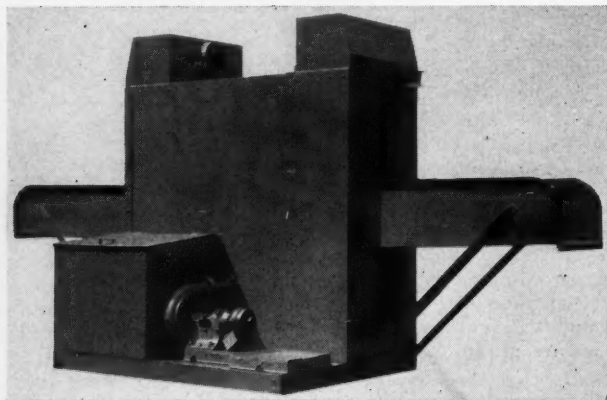


Fig. 3—One-Stage Washing Machine for Washing Rear Axle Shafts in an Automotive Plant. Arranged for push-type tramrail. Machine is "built-up" to rail to eliminate a dip in the track before entering washer.

This type, in general, produces a fan shaped jet at right angles to the header. Due to the greater dispersion it does not hit as hard as does the venturi type, but, on the other hand it covers a greater area. It finds its best application when made large enough to handle a heavy volume of water from a side or down jet. Used in this manner, it will produce good coverage. It finds its greatest use in the washing of miscellaneous small parts where no regularity of shapes occur and where a full coverage of any part within the working dimensions of the machine is required. Miscellaneous small castings or small machine parts fed separately or

wire baskets are good examples.

The third type shown at c and are designed to deliver a full spray similar to that of a lawn spray, at relatively low pressure.

Their use is not applicable to large installations where the cleaning problem is not so severe and where it would be impractical to handle the volume of solution required. The other nozzle has full coverage. All these nozzles

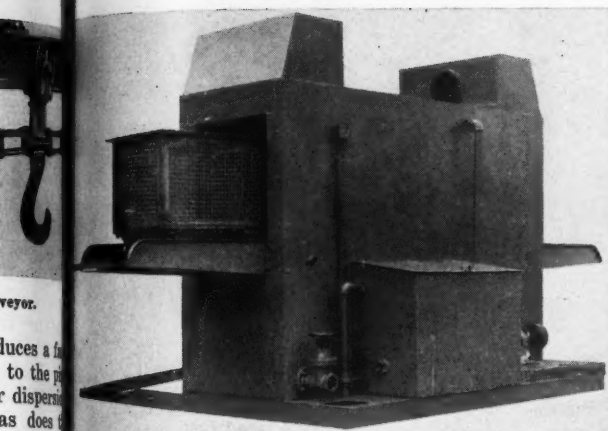


Fig. 4—Special Washing Machine for Sheet Metal Stampings. Built without power conveyor. Machine arranged to be set in pit so that wire mesh truck can be pushed into it from floor level and pushed out of opposite side.

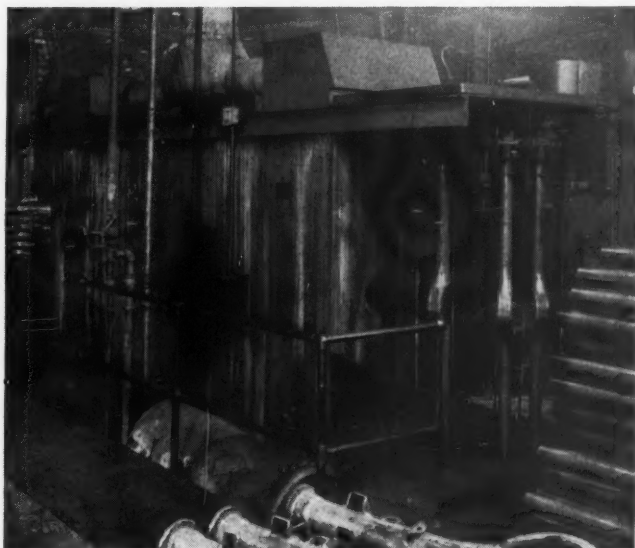
veyor.

duces a full volume of water to the parts for dispersion. It finds it difficult when the parts to be cleaned are so delicate that they cannot withstand the stress of either heavy pressure or heavy flow. Examples of the larger parts would be fenders, hoods, and various heavy sheet metal parts; the more delicate parts would be of the type of alarm clock cases, light stove parts, and various light sheet metal parts. There are, of course, many other types of parts in use. Some have their own specific applications and others are variations of those described above. The important thing is to use a nozzle that will apply the water in a manner to do the most cleaning, whether it be by direct pressure, volume, or dispersion.

The other phase of the primary washing process is the method of bringing parts to the sprays so as to make their surfaces available to the cleaning solution. Here, again, each part has its own peculiarities and sometimes these require specific treatment in material handling.

Washing machines from a material handling standpoint might be consid-

Special Washing Machine for Rear Housing Shells. Shells are carried on overhead monorail conveyor. Illustration shows how the machine is set in a pit so that the conveyor is at floor level and the washer is at elevation to permit easy handling of parts in and out. Because the washer is not on the conveyor—only the conveyor runs to the draw—parts can be loaded without trucking.



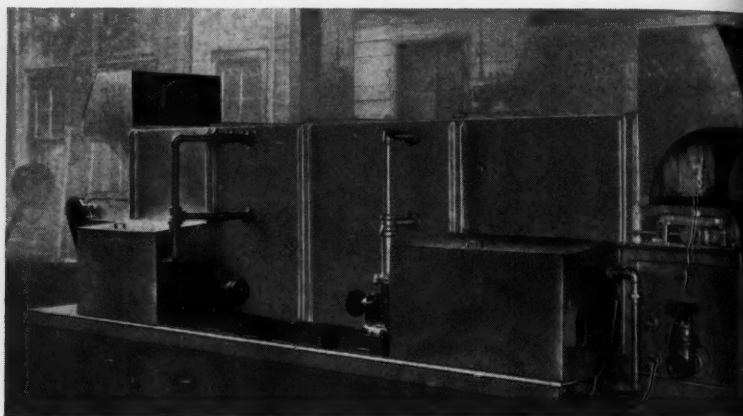


Fig. 6—Two-Stage Washing Machine for Cleaning Miscellaneous Parts. This machine employs an alkali wash with hot water rinse. A wire mesh belt is used to carry small parts as well as larger parts. A machine of this type is of ample size and capacity to do a thorough washing job on a large variety of parts. Slotted pipe headers are used for nozzles.

ered of two general types. One is the box type where the parts are pushed into the sprays, left in a stationary position, and pulled back out after washing is completed. The others are variations of the through type where parts enter the machine at one end, pass the sprays, and leave at the other. For small parts in light production where the pieces can be handled loose or in wire baskets, the first type is simple, compact, and relatively inexpensive.

It also has an application on special washers where the part is so complicated that it is necessary to apply sprays on all but one side to do a thorough cleaning job. This is usually termed fixture type washing, due to the fact that the part may be considered to be placed in and out of a "washing fixture". There are applications of this method in some of the washing operations on automobile cylinder blocks. The block is pushed over the pipes with nozzles projecting into the more remote recesses, the flow started, and, when clean, the nozzles are pulled back out.

The through type machine, in gen-

eral, lends itself best to the production washing process, and hence with the various methods of handling parts by this process that an engineer should be most familiar. More common methods, illustrated in Fig. 2, are (A) Vertical flight bar, (B) Horizontal flight bar, (C) Wire mesh belt, (D) Roller conveyor, (E) Stub roller conveyor, (F) Slide bar, (G) Roller guide, (H) Push type tramrail, and (I) Power-driven monorail conveyor. Of these types, A, B, C, and I are power-driven and the others are hand-pumped. Their use is largely self-explanatory from the diagrams and photographs.

Here, again, the use depends upon a close analysis of the work to be done. The vertical flight bar is most rugged of the belt type conveyors. The wire mesh belt is used when it is desired to convey small parts through in a loose condition. The illustrations of the roller, stub roller, slide bar, roller guide, and overhead push type tramrail show methods of carrying parts of various shapes and sizes through the washer without

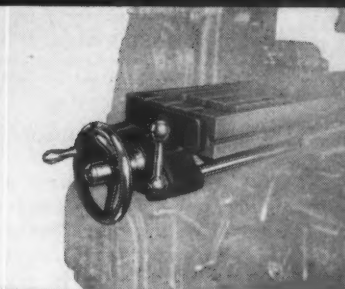
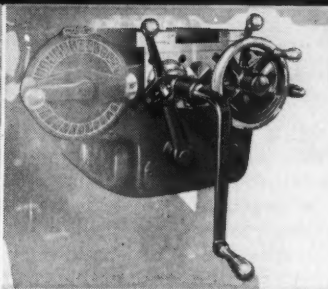


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use of power. The overhead chain driven conveyor as applied to a washing machine deserves a few special words of comment. This conveyor can be, and usually is, extended to

be combined with an existing conveyor system to good advantage. Because of this labor saving feature, the use of the overhead conveyor always be considered where practicable.



Fig. 7—Washing Machine of Modern Design with All Working Parts Enclosed. The machine employs the vertical flight bar-type conveyor and venturi-type nozzles for washing oil pans in an automotive shop.

the operations before and after washing.

When the machine operators can place parts on the conveyor and take them off, the man loading the washer is eliminated and the operation becomes automatic. In some cases the flight bar conveyor can be extended to serve the same purpose, but usually the overhead conveyor will be found to be the least expensive. Often times, too, this type of washing machine can

flow, does the trick. However, nozzles and parts must be correctly positioned to enable this action to work to its best advantage. The nozzles described above and the methods of handling materials are widely adaptable, and a selection can usually be made to handle most jobs. A working knowledge regarding this equipment and these methods should be a part of every process engineer's "stock in trade".

**Wicaco Precision Internal Grinder** is the subject of a four-page folder now being issued by The Wicaco Machine Corp., Wayne Junction, Philadelphia, Pa. Features of the machine which are stressed in the folder include the under-slung drive, rigid workhead, water-cooled wheel head, and automatic reverse. According to the manufacturer, the grinder is one of the most complete machines of its type and is shipped ready to hook up to the current outlet for immediate operation. Photographs and a blueprint

drawing are shown and specifications of the grinder are given. Copy free.

**Davis Block Type Boring Equipment** Bulletin No. 300, a revision of Bulletin No. 100, illustrates and describes Block Type Boring Tool Equipment manufactured by the Davis Boring Tool Division, Larkin Packer Co., Inc., Maple Ave., St. Louis, Mo., in great detail. The bulletin contains complete engineering data for the tool designer and engineer. Copy free upon request.

It has been the writer's purpose in this short treatise to present a few general facts concerning what he likes to term the "primary washing operation"; that is, bringing the cleaning solution and the parts to be cleaned together in correct relationship with each other. The chemical action of the solvent in dissolving and loosening the grease together with the scouring action of the hydraulic

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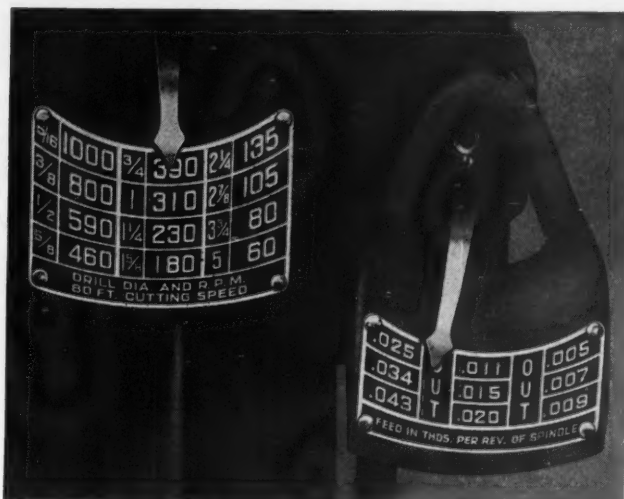
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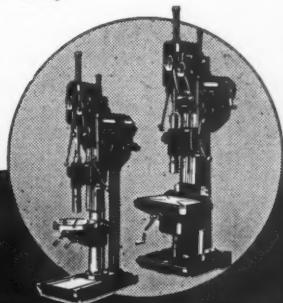
The speed plate at the left shows at a glance the 12 spindle speeds provided progressively from 60 to 1000 r.p.m. on the 24" and 28" machines. On the 21" machine, 9 speeds are available.

At the right is shown the feed plate which on the 24" and 28" machines provides 9 rates of feed from .005" to .043" per revolution. On the 21" machine 4 rates of feed are provided.

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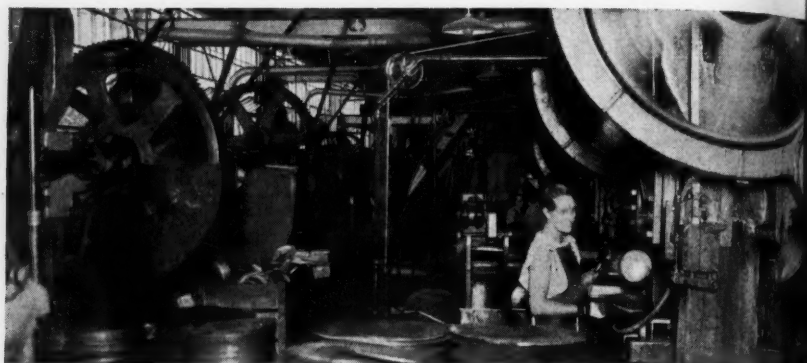
feed, closely graded in range, fine feeds are available for small drills, coarse feeds for large drills and fast feeds for reaming, every tool used can be operated to the economical limit of its endurance.

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## Blanking Thin Materials with Compound-Type Piercing and Blanking Dies

*The development of alloy tool steels has fostered the use of sectional dies for many types of work. In this article the author outlines the principal features of sectional die construction.*

By C. L. SZALANCZY

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

**T**HERE are many instances in which a variety of types of metal cutting dies could be employed to stamp out the same blank. In some cases, any one of these different types of dies would produce the blank in a manner that would be satisfactory from practically all standpoints. Of course, one type of tool may produce the blank in a little less time than another, while a die of a still different design might take a little more time but save a little more on raw material.

Business conditions, as they exist today, are making it more imperative

than ever that the engineering department and the tool room work in close harmony with each other. Both departments are making a definite effort to reduce costs. Wherever possible the engineering department is simplifying the design of punches so as to make them more practical for production on the punch press. The toolroom, on the other hand, is doing everything possible to produce the tools in a manner that will minimize the effort and expense incident to upkeep while extending the productive life of the dies to the maximum. Different tool steels and various

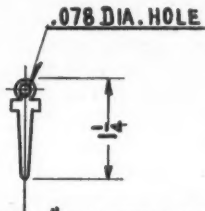
Methods of hardening the tools are being tried to the end that more machings may be produced per grinding of the dies. And while these objectives are being sought, the item of first importance—accuracy of the die—must not be overlooked or sacrificed.

The various types of alloy tool steels that have been developed in recent years offer an advantage which has been recognized by the more alert designers. Through the use of such steels, the old-fashioned, bulky, solid pieces of dies are being replaced by sectional dies made up from small sections of tool steel that can be cut from standard bar stock. Sectional die construction is rapidly gaining favor in the stamping industry due to the comparative ease with which the small tool steel pieces can be easily cut, machined, and ground to the contour of the blank. The only real problem confronting the well-qualified die designer is determining which type of tool will be most advantageous to use.

As a general rule, the product engineers have no part in ordering—or in specifying—the types of design of the tools that will be used to stamp the blanks, although they are expected to design the parts so that they can be produced with a minimum of expense. The original engineering drawings of the parts are sent direct to the tool department, where they are analyzed and studied and any effort is expended on tool drawings. If any changes are advisable in order to simplify the tooling, the engineering department is notified and the necessary changes are made. Then the correct types of tools for the sequence of operations for the tools are determined and the order for the tools are drawn and used in the tool design department. In determining the type of tool to be used in producing a blank, it should be remembered that the type of tool

which costs least to build is not necessarily the most economical in the end.

A good example of a blank produced in the type of die with which this article deals is the pointer illustrated in the drawing Fig. 1. The pointer is of 0.014 in. thick sheet steel and has a 0.078 in. diameter hole punched in one end. The tool used to produce



### BLANK FROM .014 THICK SH. STEEL

Fig. 1—Drawing of blank produced by the die illustrated in Fig. 2.

this blank is a compound type piercing and blanking die the design of which is shown in Fig. 2.

### Details of Die Construction

Item 1 of Fig. 2 is the top die shoe, which is burned out to shape from stock-size hot rolled steel plate as specified on the tool drawing. It may be noted that in this case the guide pin bushings are located across the corners of the shoe from each other, the pin at the back being on the left side while the one at the front is on the right hand side. This method of placing the guide pins locates them as far apart as possible and aids in keeping the punches in alignment.

The punch shoe is carefully machined out on the lower side to allow the two sectional die pieces to be set in to about one-half their depth. Thus the punch shoe also serves as a shrink ring and prevents the die pieces from opening up sideways when the tool is in operation. Before starting the construction of the die, the top and bottom surfaces of the shoe are slab-ground to assure perfect setting. The

smaller opening seen in the illustration is profiled into the shoe, and the stripper plate is afterward inserted into this opening. Three counterbored holes provide the nests for the three compression springs.

Inasmuch as the shoe is machined out in the center, there is not enough material left to hold or anchor the punch stem that is usually used to hold the upper member of the tool in the punch press ram. Instead of a stem, therefore, this tool is equipped with an adapter. The adapter, item 2, is made from stock-size cold rolled steel bar, machined as shown in Fig. 3 and anchored to the punch shoe with four fillister head screws. The adapter slides onto a special T-shaped holder on the press ram.

Item 3, Fig. 2, is the die shoe, which is also burned out of hot rolled steel plate. The shoe is surface ground on the top and bottom and a holding ledge is machined along the two sides for fastening the die clamps. A recess is machined in the center to allow for setting the main punch holder plate and stripper. At a point  $\frac{1}{2}$  in. from the top the shoe is machined down, leaving only a small upright section standing to guide the stripper. The shoe is drilled and reamed for the two guide pins.

Items 4 and 5 are the right and left hand plates, which are made from cold rolled steel stock. The plates are made in halves to facilitate machining, and four small wire pins, item 6, are used to hold the two halves together. Two of these pins also pass through the stripper, item 7, and prevent it from pulling out of place. The stripper is of tool steel, rough machined and hardened to 60-63 on the Rockwell "C" scale. After hardening, the stripper is ground to the specified size.

The punch, item 8, is made from a type of tool steel that is particularly suitable for frail punches, and operates in a hole in the stripper

which must be a close slip fit to prevent the punch from breaking or bending in operation. The punch is machined nearly to size, leaving a few thousandths of an inch for finishing and is then hardened to 50-55 Rockwell. This hardness has been found to produce the best results for such work. After hardening, the punch is ground to size and is press fitted directly into the punch shoe indicated as item 1. The punch is made with double shoulder which gives it sturdier backing and also a large guiding surface than would be afforded otherwise.

The die, which is made in two halves as indicated by items 9 and 10, is of a suitable grade of tool steel bar stock. The parts are machined and hardened to 60-63 Rockwell "C" and are then ground all over. The blank contour is finished by grinding and no taper is allowed. The sides are made perfectly straight to guide the upper stripper. The two halves of the die are held together by means of two fillister head screws, indicated as item 11. Four fillister head screws are used to attach the assembled die to the shoe. Two dowels, one in each half, will keep the die from shifting out of place endways on the shoe.

The stripper assembly, items 4, 5, 6, 7, are inserted into the space provided for them in the punch shoe where they are retained by the die. The stripper is made to a slip fit in the die and has  $\frac{1}{8}$  in. allowed movement upward. It is sprung back by the three compression springs, item 12, to eject the finished blank from the die.

The punch, item 13, is rough machined out of the same grade of tool steel as the die pieces. The hole is for piercing the 0.078 in. diameter perforation in the blank is carefully profiled in, after which it is filled with fire clay and the punch is hardened to 60-63 Rockwell "C". After hardening, the punch is finished



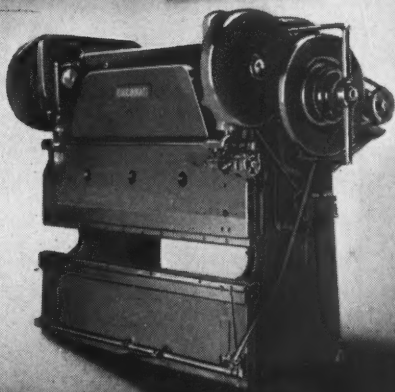
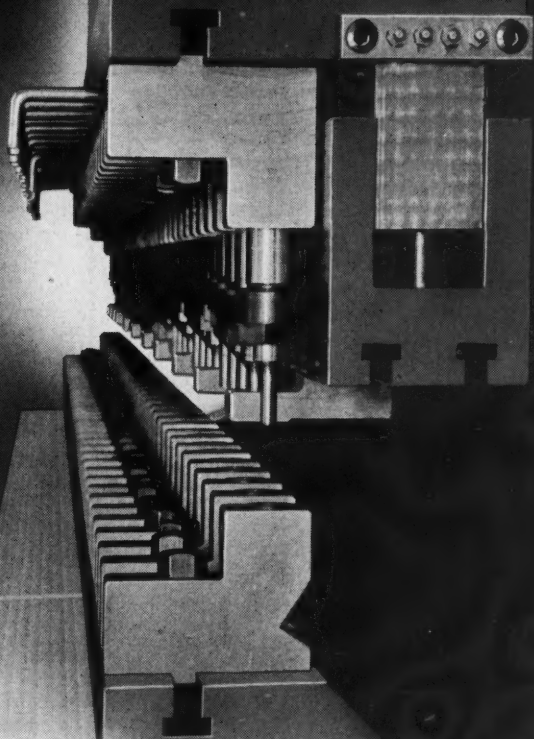
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inding all over to the sizes speci-  
ed on the drawing.

Care should be taken by both the  
designer and the toolmaker to allow  
the correct punch and die clearance,  
thus eliminating the tendency toward  
sloppy or loose fit and preventing  
the possibility of a noticeable burr on  
the blanks. Furthermore, when the  
punch is frail, as it is in this case,  
the closer the clearance is held the  
the opportunity there will be for  
side bending which might result  
in breaking the punch or the possi-  
bility of fracturing the cutting edges  
of the die.

The punch holder plates, items 14  
and 15, are made from standard stock-  
ed cold rolled steel bars. They can  
be either finish machined or ground  
to the contour of the punch, item 13.  
The two inside edges must be ground  
to ensure a close fit, and the two  
halves are held together, after the  
punch has been inserted, by means of  
two fillister head screws.

The punch plates are anchored to  
the die shoe with four fillister head  
screws that project upward through  
the die shoe and are threaded into the  
punch plates. Two dowels will pre-  
vent the plates from shifting end-  
ways. Four clearance holes are pro-  
vided to allow the screws that hold  
the stripper to pass through the  
punch plates.

The pieces which form the strip-  
per, items 16 and 17, are made from

cold rolled steel bar stock. They are  
machined in the same manner as the  
punch holder plates with the excep-  
tion that the blank contour is made  
to a slip fit around the punch. The  
two halves of the stripper are held  
together with two fillister head screws  
and are located and permanently held

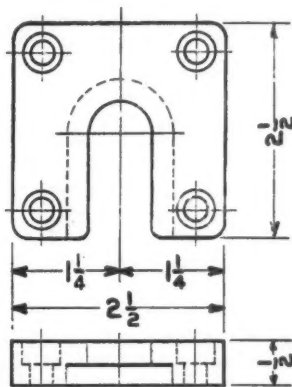


Fig. 3—Drawing of special adapter used to  
attach the punch to the press ram.

in place with four fillister head screws  
that move through the clearance holes  
in both the punch plates and the die  
shoe. The shoe is counterbored so  
that the screw will be free to move  
up and down with the action of the  
press.

The stripper stands 1/32 in. above  
the top surface of the punch when the

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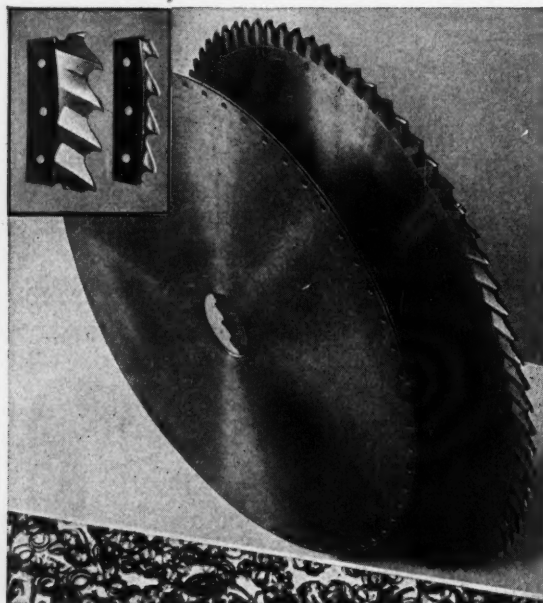
die is in open position. As the punch enters the die in the upper member of the tool, the stripper moves downward, and as the die recedes, the stripper is brought back up by the four compression springs indicated as item 18 in the illustration. The stripper screws are anchored in place, after being adjusted to the correct height, by four small fillister head screws which are threaded through the end of the stripper plates. Locking the stripper screws in this manner prevents them from working loose in operation and precludes the possibility of damaging the punch.

Item 19 is a guard, made from  $\frac{1}{8}$ -in. sheet steel. One of these is placed at the front and another at the back of the die. Two slots in the guards provide passageway for the heads of the screws which hold the stripper plates. The guards not only protect the press operator from injury, but also prevent pieces of the material or other objects from getting under-

neath the stripper and causing damage to the stamping tool.

In some instances the guide pin bushings are omitted, in which case the guide pins are guided entirely by the holes that are provided for them in the punch shoe. However, it will be found that in most cases it is better to provide the pins with bushings. Both pins and bushings are usually carried in stock in the tool department, and the bushings may be quickly and accurately be set into the shoe with Matrix alloy. The use of Matrix alloy eliminates what would otherwise be a rather costly operation of aligning and profiling the two guide pin holes in the top shoe. The pins and bushings are indicated on the drawing Fig. 2 as items 20 and 21.

A material guide is provided on one end of the tool, the guide consisting of the base, item 22, and the two guide bars item 23. The base should be made from  $\frac{1}{8}$ -in. sheet steel and should be at least four in. long. The



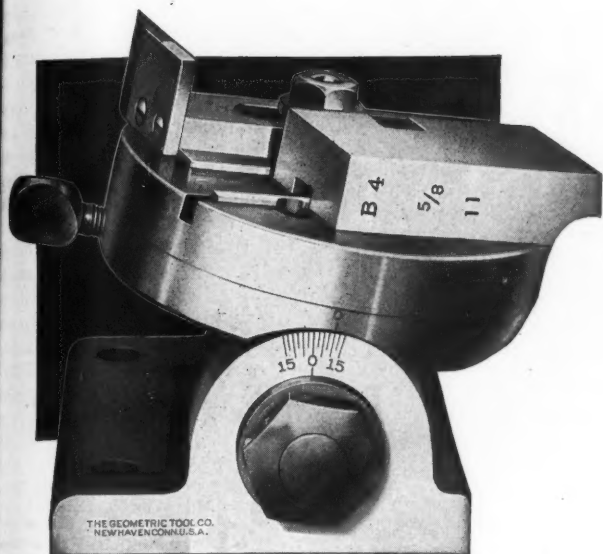
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guide bars are mounted on the base. The bars can be cut from cold rolled steel stock, and should be fastened to the base with several small filling head screws that extend upward through the plate and are threaded into the guide bars. Two round cold rolled steel pins, item 24, fit into holes that are provided for them in the lower shoe and are fastened to the under side of the base with flat head machine screws. By loosening the screws, item 25, the material guide may be lowered and adjusted to the new height of the stripper from time to time as the punch is ground down.

When the tool is in operation, the finished blank is ejected from the back onto the raw strip material while the waste from the 0.078 hole passes down and out through the hole in the bottom shoe.

"Cincinnati 6 and 10-In. Plain Hydraulic Grinding Machines". This attractive printed 28-page booklet, designated No. G-410, illustrates and describes Cincinnati 6 and 10-In. Plain Hydraulic Grinding Machines manufactured by Cincinnati Grinders Inc., Cincinnati, Ohio. Features of the grinders which are discussed include the compactness and convenience of the machines, fine touch hydraulic control, smooth drive of the work-piece, protected electrical controls, rigidity in design, rapid stock removal to fine finishes, accessibility of control buttons and levers, and permanent alignment. Numerous attachments are shown, and specifications are listed for the grinders. Copy of the booklet is free upon request.

Milne High Speed Steel. In this four-page folder are presented five types of Milne High Speed Steels—Imperial Major, Hyco, Milvan, AMC and M-M—and also Imperial Major Ground Tool Bits. Each type is spray-painted a specific color for identification purposes in accordance with the Milne Color Code. The operations for which the steels are recommended include turning, boring, planing, shaping, drilling, broaching, milling, threading, and so on. Get free by addressing a request to A. Milne & Co., 741 Washington St., New York, N. Y.

June, 19

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# Time

In a

Modern

Plant

# Study

# Methods

BY G. A. BAESLACK

Manufacturing Engineer

**A**LTHOUGH a great variety of manufacturing activities are carried on at the East Pittsburgh Plant of the Westinghouse Electric and Manufacturing Company, the method of time studying the operation cycles of these widely varying production and expense labor activities is essentially uniform; variations from this standard procedure are made only to suit individual peculiarities of certain jobs where it would be contrary to common sense rules of good economic shop practice to strictly adhere to standard procedure.

The aim always is to establish for each job a time allowance which can be met by an average operator working at normal speed under economically efficient conditions; i.e., conditions commensurate with the quantitative activity of any particular job. This method permits the higher skilled and more industrious operators to gain over the established time allowances in proportion to their skill and the intensity of their application, while those whose performances are below average will not be likely to meet the time allowances.

To accomplish this aim, our time study men are taught to proceed in accordance with a logical uniform method which has proven its worth

through many years of practical application. An outline of this procedure is presented in the graphic analysis chart, Fig. 1.

## Preliminaries

An operator to be time studied is usually chosen with careful regard to his familiarity with the respective job and his attitude towards time study, which is because the higher skilled operator usually gives a more consistent performance and a skilled operator who is friendly disposed is more likely to co-operate with the time study man in improving the method of doing the job that is to be time studied. Due allowance for higher skill is then made by the application of the leveling process.

It has been found inadvisable to time study an operator who persists in his antagonistic attitude toward time study, even after repeated efforts have been made on the part of the time study man and immediate supervisor to change this attitude by thoughtfully explaining the time study procedure and the final derivation of the time allowance.

An operator that has never been time studied is first made acquainted with the procedure by having the time study man carefully explain



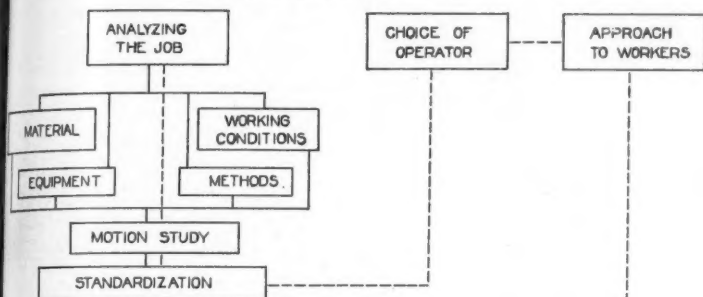
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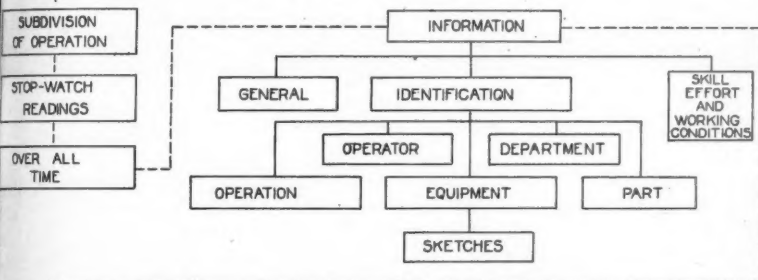
is expected of him; how a com-  
and unbiased performance rec-  
is developed in full view of the  
operator from the notation of the  
watch readings at the conclusion  
every elemental operation; that  
stop watch is kept running con-  
sistently throughout the time study  
the manner in which all for-

eign and impertinent operations are  
noted on the time study sheet, and  
how the operator's degree of skill  
and effort is compensated for in the  
ultimate time value. Such personal  
contact with an operator tends to al-  
lay his fears and suspicions, and fre-  
quently eliminates the nervous strain  
from which he may suffer when being

## PRELIMINARIES



## OBSERVATIONS



## COMPUTATIONS AND CONCLUSIONS

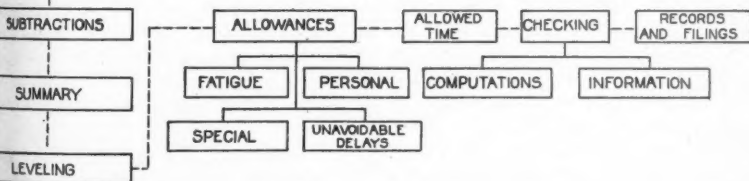


Fig. 1—Graphic Analysis of Motion and Time Study





Fig. 2—The time study is made from a point close enough to note every detail of the operation but not close enough to interfere with the operator.

time studied for the first time.

The actual making of a detail time study is always preceded by a careful analysis of the job. This enables the time study man to become thoroughly familiar with the condition of the equipment, operating methods, and inspection requirements. This preliminary investigation frequently results in a more efficient and simplified standardized operating procedure due to the elimination of unnecessary elementary operations, through the application of combination set-ups, by the introduction of up-to-date tools and fixtures, by securing a more effective utilization of the available machine tools, and by having the operator supplied with parts that are in practically identical conditions.

In the case of fitting and assembling operations, this preliminary analysis usually results in improved handling appliances, an organized material supply system, and the introduction of definite standards of dimensions and finishes which will comply with the

engineering and inspection requirements of the respective jobs.

This analysis, moreover, conceals itself with the condition of the operator's environment, such as room temperature, ventilation, illumination and possible safety hazards, which, when unfavorable, affect the operator's mental and physical comfort adversely and therefore have an important bearing on the individual operator's attitude toward his job and rate of performance.

Finally, this preliminary analysis includes an investigation of the quantitative activity of the part worked upon and the frequency of recurring orders and their probable magnitude. This information determines the extent of the equipment and tool improvement program that may be warranted, and how intensively the problem in question should be standardized and time studied.

After the conditions and operating method have been standardized in an economically satisfactory manner,

June, 19

# THE NEW "860" for job lots, too . . . . .

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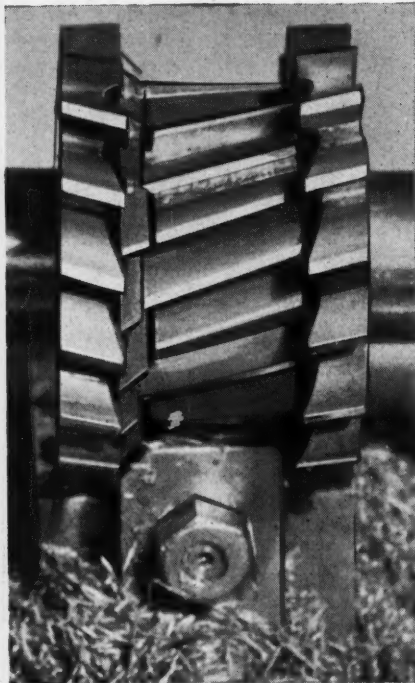
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ation program to promote efficiency. The operator must then be prevailed upon to adopt the revised cycle motions before the actual detail time study is made.

#### Observations

In the process of making the detail time study, the operation cycle is divided into as many elemental operations as are possible without inter-

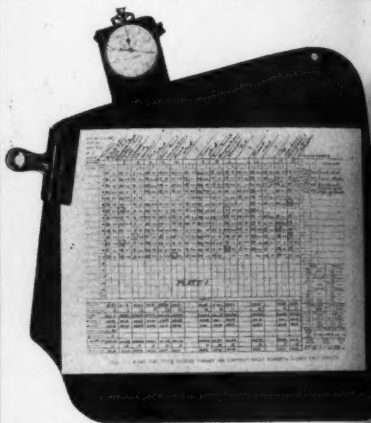


Fig. 4—Time Study Observation Board, designed to hold both watch and pad of Observation Sheets.

fering with the accurate reading of the stop watch. The detail operations are listed in their proper sequence the first time each element occurs in the cycle, in the oblique spaces at the top of the time study sheet and each repetitive element in the cycle is noted by writing the first identification number of that element at the head of every other column in which this same element occurs, as shown on the Observation Sheet Fig. 3.

The hour decimal watch and the type of time study observation board shown in Fig. 4 have been adopted as standard equipment for the making of detail time studies. The watch is allowed to run continuously and a reading is taken at the termination of each elemental operation, the last

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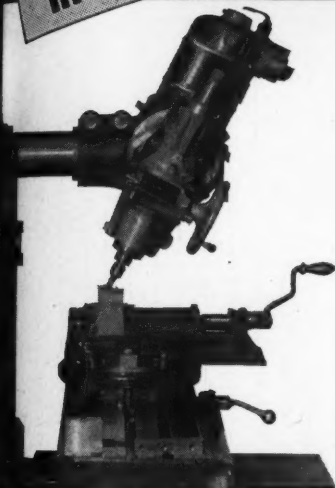
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STUDY No. 1 DATE 12-2-36

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DEPARTMENT F-1 OPERATOR Donger No. 209

EQUIPMENT #5 Warner & Swasey

Turnt & Lather

MACHINE TOOL NO. 4689

SPECIAL TOOLS, JIGS, FIXTURES, ETC.

CONDITIONS Excellent. Machine had been recently repaired.

OBSERVER A. B. Sew APPROVED BY John Doe

MOULD PART DESCRIPTION Large Die #35433 INS. SPEC. 285792 SUB. 8

PATTERN 284694 L. SPEC. ITEM 2

No.	ELEMENTS	SMALL TOOL NOS. FEED SPEED, DEPTH OF CUT, ETC.	ALLOWED TIME (OTHER THAN TURNING TIME)		TOTAL TIME ALLOWED	
			ALLOTTED TIME PER TURN (ON CYCLE)	ACCURATE TIME PER TURN (ON CYCLE)		
1	Set and place stud in chuck				0028	
2	Tighten chuck				0024	
3	Start machine				0004	
4	Face stud	800 (3425-4452)			0032	
5	Turn turret - over position	(Hand Feed) 0015 4			0060	
6	Point stud	900 H.P. (H.W. Tool) 2 P.M. 1/16" 1/16" 0.025/Rev. 3/16"			0013	
7	Turn stud				0036	
8	Turn turret - two positions				0016	
9	Change tool	900 H.P. (3425-4453)			0018	
10	Thread stud	Hand Feed (Auto. Knock-off)			0031	
11	Stop machine	300 RPM			0021	
12	Remove stud				0016	
TIME ALLOWED, SET UP, .50 Hr.					TOTAL	0339 hr.
REMARKS:						
Due to turret construction, it takes no longer to turn turret two positions than it does to turn over position.						

Fig. 5—Time Study Observation Sheet. The set-up time and piece time allowances are recorded in the spaces allotted and the pertinent set-up and operation cycle data is posted on both sides of an instruction sheet for the supervisor and operator.



that it does to turn it out position.

the recorder  
both sides

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Metal Cutting Band Saw  
**BLADES**

two figures of each reading being recorded in the respective column "R". If an operation extends over one revolution of the hand, then the number of complete revolutions must be noted and three or more digits recorded.

The number of pieces to be time studied on a particular job depends upon the activity, the degree of standardization, duration of the major operation cycle, the number of repetitive minor elemental cycles involved in the latter, and the extent to which the job in question depends upon the skill and physical exertion of the operator.

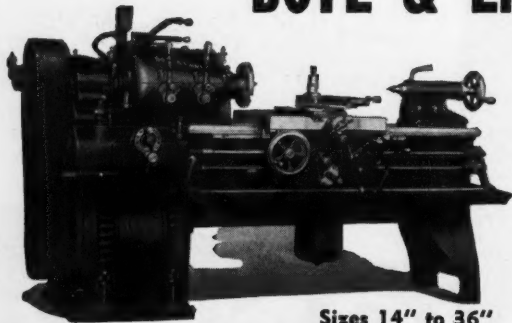
Elemental operations performed out of their proper sequence are recorded by drawing a line through the middle of the allotted space and then noting the reading of the element just completed below the line, the reading of the termination of the elemental operation performed out of its proper sequence being noted above the line

as shown at the right hand end of line 3 in Fig. 3. Elemental operations omitted by the operator are indicated by a line drawn through the allotted spaces, and the letter "M" indicates elemental observations missed by the time study man as illustrated on lines five and seven.

Foreign elements; i.e., elements which are not included in the regular line-up at the top of the sheet, are recorded in the reserved spaces at the extreme right hand end of the sheet and their related occurrence with respect to the regular elemental operations are indicated by writing the alphabetical letter symbols of the foreign elements in the spaces of the regular elements that were intercepted by the former as shown by the letters "A", "B" and "D" in the first and second columns.

All time elapsing during the total observation period, as recorded in the allotted spaces in the lower right hand corner of the time study sheet, must

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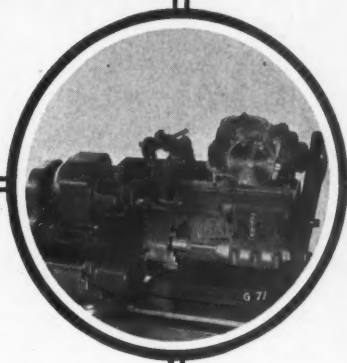
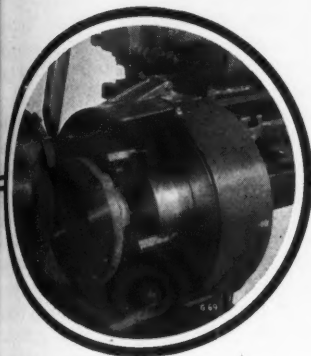
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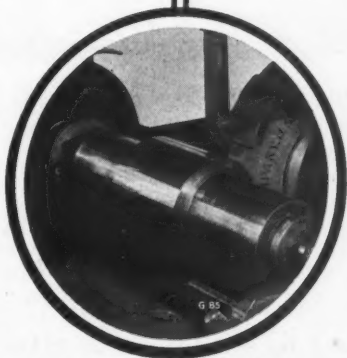
**W**ILL you bear with us while we use that overworked word "versatility" again? For we are convinced that its use is justified when the Landis 14" Type C Hydraulic Universals are being considered.

Now to convince you. The face grinding set-up, above to the left, is made by swiveling the headstock although sometimes the wheel base is also swiveled. To the right above is an internal grinding set-up. A center rest is utilized when internal grinding long work such as spindles.

The view to the right is ample evidence that the machine may be used to grind small rolls. This, to be sure, is only one of the many, many parts that may be ground between centers. In the tool room it is *the* machine for grinding boring bars and mandrels. Special uses include such operations as the grinding of radial airplane engine cams.

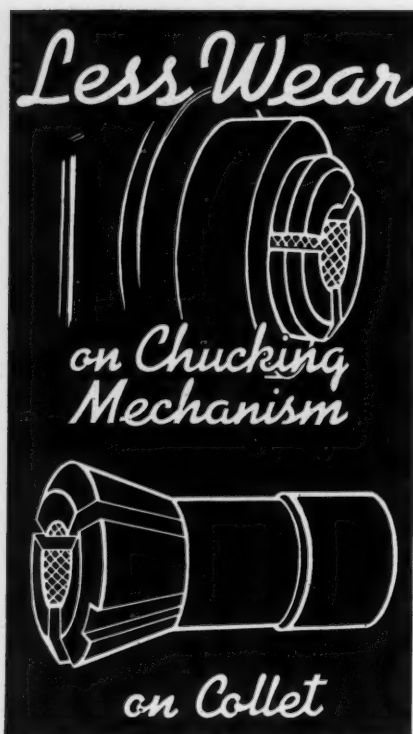
Doesn't all of this sound like true versatility to you?

No 231



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be accounted for. However, only distinctly essential foreign operations will be included in the allowed time. The sum of all the regular elemental times and the foreign operation values should equal the total overall time; thus the latter may serve as a ready check on the performance during the study, but has no bearing on the allowed time—which is solely determined from the recorded elemental time values.

Before leaving the operator, the time study man checks with pencil on the front of the first time study sheet in the indicated spaces, his evaluation of the operator's performance with regard to "Skill", "Effort", "Operating Conditions and Consistency of Execution", in order to be able to later to develop the levelling factor. On the back of the last time study sheet of a series, he notes the pertinent items of information concerning the operator and job studied, such as the drawing and item, or pattern numbers, a brief description of the operation cycle and of the equipment used, the operator's name and check number, depth of cuts and speeds and feeds for every metal cutting operation, and finally, in the space reserved for remarks, a brief general description of how the work was done. This description can be amplified with a sketch of the part worked upon, in the space provided for that purpose.

In the allotted spaces at the upper left hand corner of the front and also of the back of each sheet of a time study are recorded the identification number of the study and the date on which the study was taken, as shown in Fig. 3 and 5.

(The concluding section of this article, comprising the computations and conclusions, will be published in the July issue.)

The reader who mentions the name "Modern Machine Shop" when writing to advertisers is helping to build a bigger and better magazine for his own benefit and the benefit of his fellow-executives.

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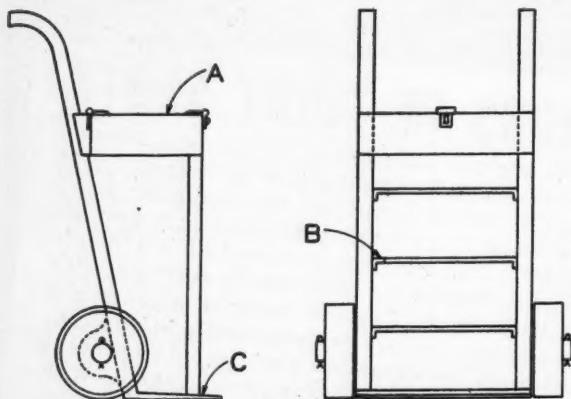
## Ideas from Readers

This department is a clearing house for ideas from readers . . . Every "kink" or short cut published will be paid for.

### Combination Ladder and Truck for The Locomotive Shop Airman

By JOHN H. HICKS

**I**LLUSTRATED in the drawing is a portable toolbox and ladder for the airman to be used when working on compressors, feed water pumps,



Drawing of Combination Ladder and Truck for the Airman

and so on. While the airman does not need a large array of tools, it is inconvenient to move about from one engine to another in a large roundhouse carrying a ladder on one arm and a handful of spanner wrenches. packing, and other tools in the other.

The truck shown here provides room enough, as indicated at A, for necessary tools such as packing hooks, special wrenches, waste, pot for valve oil, and so on. It also serves as a sub-

stantial ladder, as illustrated at B, and the top can be used as a platform when working on pumps. The device is made by modifying an ordinary truck, substituting larger wheels so as to make it easy to handle over rough brick floors, and extending the front portion, as shown at C, to form a substantial base when the truck is placed in an upright position. The

supplementary frame which forms the ladder and holds the combination toolbox and platform, is secured to the truck frame by welding. By using an ordinary steel truck, such as is used for handling material in shops and roundhouses, this combination ladder and truck may be made within a few hours and will be well worth any time or expense involved.

### Pistol Grip Cotter Key Extractor

By CHAS. H. WILLEY

**I**LLUSTRATED in the drawing is a device designed to make possible the quick extraction of cotter keys in difficult places. The tool consists of three moving parts; the hook A, the ratchet slide B, and the operating hand grip C. The hand grip C is made



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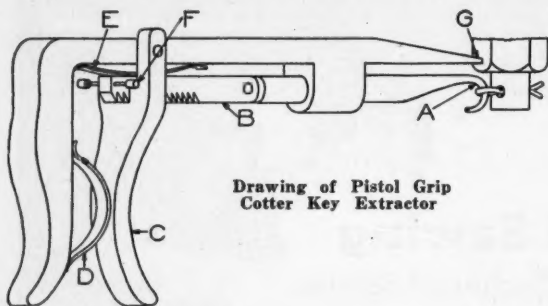
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

CHICAGO

U. S. A.

chined to provide clearance for the ratchet B, and is equipped with a tooth of a size and shape to fit into the ratchet. Tension on the ratchet is



Drawing of Pistol Grip  
Cotter Key Extractor

provided by the use of the springs D and E.

To use, the slide B is pushed out past the nose of the tool G, which is done by making use of the push bar F, and the hook A is inserted through the head of the cotter key. Then with the nose G pressed against the nut, as shown, the device is gripped in the hand and the ratchet operated, by means of the handle C, until the key is pulled from the hole.

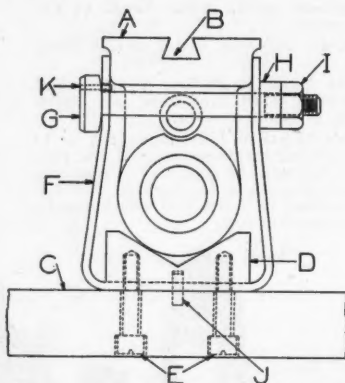
## Self-Centering Milling Fixture

BY W. M. HALLIDAY,  
England

**I**LLUSTRATED herewith is a fixture that is used for holding a casting so that a dovetail slot can be milled in the exact center, as shown, regardless of the fact that the sides of the casting are not finished. The fixture consists primarily of the V-block D, the U-shaped clamp F, the

bolt G, and the base C. The workpiece A is located between the sides of the clamp F and rests in the "V" of the V-block D, as shown. A slot on the under side of the V-block provides clearance through which the bottom part of the clamp F passes, the base, clamp, and V-block all being anchored together with the fillister-head screws E. The dowel prevents the V-block and clamp from shifting in any direction.

With the workpiece located in position, the bolt G is passed through holes in each leg of the clamp and a thick washer, H, and nut I are slipped into place over the threaded end. Upon drawing the nut tight, the two sides of the clamp will be brought to bear against the sides of the casting.



Drawing of Self-Centering Milling Fixture

To prevent rotation of the bolt as the nut is tightened, a small dowel K is fitted into a hole drilled for it through the head of the bolt and into the side of the clamp. Unnecessary spring of the sides of the clamp in clamping can be avoided by positioning the bolt as closely to the under-

une, 1938

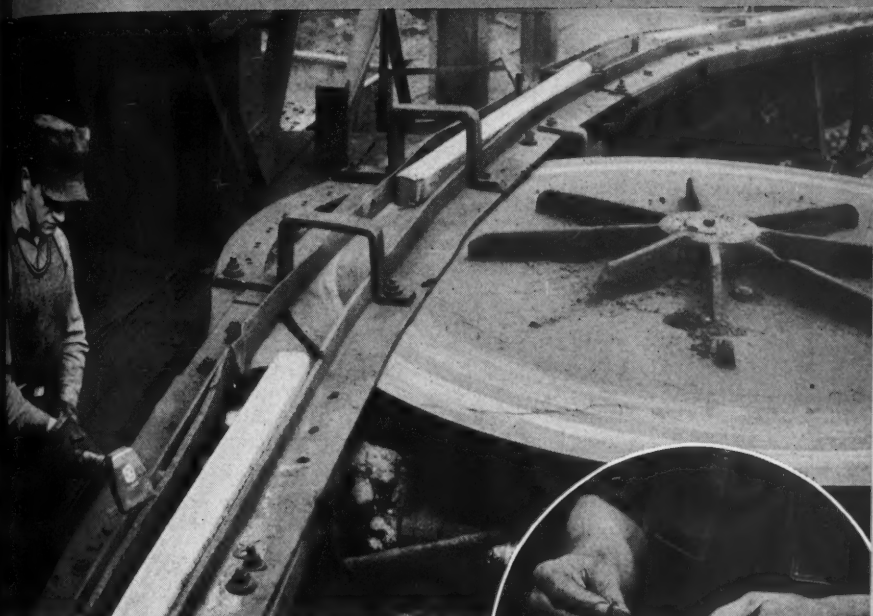
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trated here through  
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Pittsburgh, Pa.

side of the shoulder on the casting.

The fixture can be made more convenient and clamping time can be reduced by substituting the short lever or handwheel for the nut I, providing sufficient clearance is available.

## Tools for Spacing Holes in Dies and Jigs

BY DONALD BAILEY

THE drawings present the design of a tool designed for use in laying out and drilling holes in dies, jigs, and similar work where the utmost accuracy must be maintained between centers.

The fixture is of simple design and construction, consisting principally of two pieces of flat stock A and B, Fig. 1, pivoted at one end by a bushing C and carrying two similar bushings D and E. Each bushing has a shoulder

and is threaded for a locknut by which it can be anchored in position. The bushings D and E can be adjusted

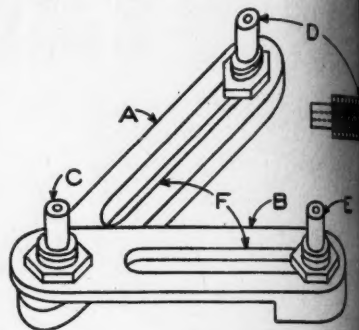
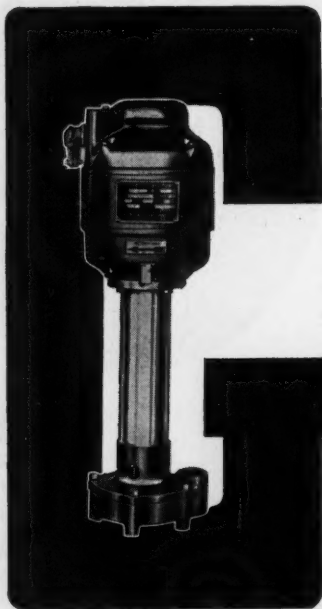


Fig. 1—Tool for Spacing Holes in Dies and Jigs.

ed to any point in the slot in which they are located. The entire tool can be attached to the work by bolting through the slots in the parts A and B or anchored by means of clamps



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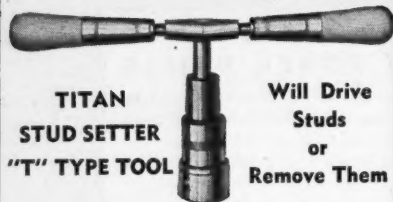
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For corners where interference prevents complete rotation of T Handle tool. Tool slipped over studs. Is ready to go. Right or left hand drive with ratchet control.

Tool grips and drives studs in or out with first right or left movement, continuing its work until job is completed. The roll grip means a quick trip from stud to stud.

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Each bushing has a small hole through its axis; thus it not only serves as a locating pin but also serves as a bushing through which a small drill can be passed to drill a hole at the required point.

Different applications of the tool are shown in Fig. 2, the drawing illustrating the use of the tool for drilling a number of holes at a com-

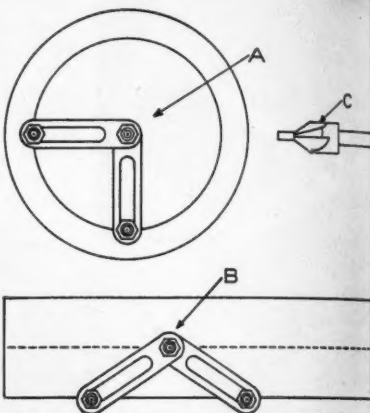


Fig. 2—Application of Tool for Drilling Holes on a Circle or in Line with Edge of Workpiece.

mon distance from the center and the drawing B showing how the tool can be used for drilling a number of holes in line with the edge of a workpiece.

Where a hole larger than the bushing size is desired, the countersink can be used.

## Emergency Pressure Plug

BY WILLIAM CHASE

**O**CCASIONALLY it becomes necessary to seal a hole in a tank or other vessel where it is not practical to thread the hole or is impossible to get at the inside of the tank. In such a case, a very good job can be done by using a plug of the type illustrated in the drawing.

A tapered piece A is made with a



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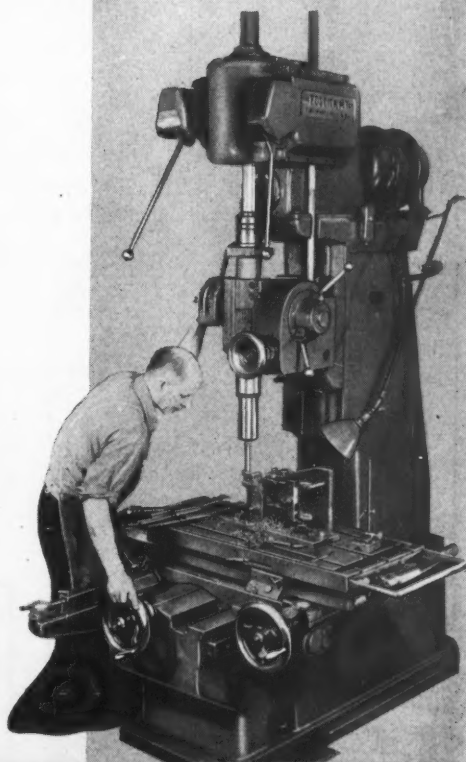
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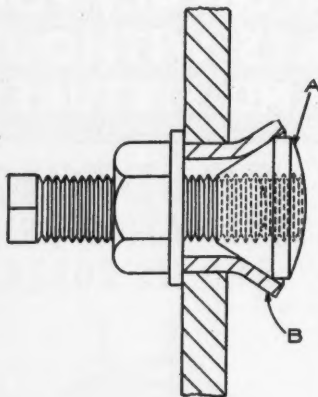
*Wire or write for the whole  
story.*

## FOSDICK COMBINATION DRILL AND JIG BORER



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hole through the center and threaded or tapped to fit a screw or bolt of a size approximately half the diameter



Drawing illustrating use of emergency pressure plug to seal hole in tank.

of the hole that is to be sealed. The large end of the taper is turned to a

size that will just pass through the hole. Then a bushing B is made from copper or brass, or a section of tubing is cut, of a diameter that will also just pass through the hole, this piece being made long enough so that it will extend perhaps from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. on the inside of the tank. The remainder of the outfit consists of a nut and washer.

To use, the nut is threaded onto the screw backwards until it is near the head, then the washer is put on, followed by the bushing and finally the tapered section A. The end of the screw carrying the tapered piece is now inserted through the hole and the bushing is pushed in until the outer end is flush with the wall of the tank. The nut is screwed down into place and finally, as the nut is tightened, the tapered piece is drawn into the end of the bushing, flaring it and forming the desired seal.

## Improved Polishing Wheel for Hand Grinder

BY ALEXANDER JONA, JR.

THE illustrations show the design and appearance of a "home-made" polishing wheel which, when used with a Dumore grinder or other small grinders of similar type, is very useful for smoothing the surfaces of tools and dies.

The holder is turned from a section

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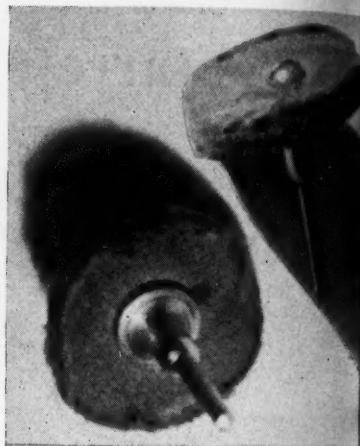
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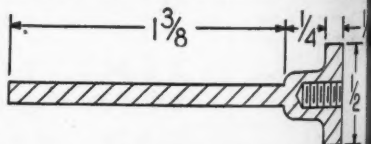
of steel bar, the diameter of the shaft being determined by the type and size of grinder with which the tool is to be used. The exact center of the large end is drilled and tapped for



Polishing wheel used with Dumore grinder or other small grinder for polishing die and tools.

No. 10-32 thread screw. A sheet of emery cloth supplies the material for the polishing wheel, the grade used being governed by the quality of finish desired on the work.

The construction of the wheel is simple, consisting simply in tearing



Drawing showing design of holder for emery cloth polishing wheel.

the emery cloth into 1 1/2-in. squares, piercing a hole through the center of each square, and then fastening a dozen of the squares to the holder by means of the screw, as shown in the photograph. The first few revolutions of the wheel in contact with the work

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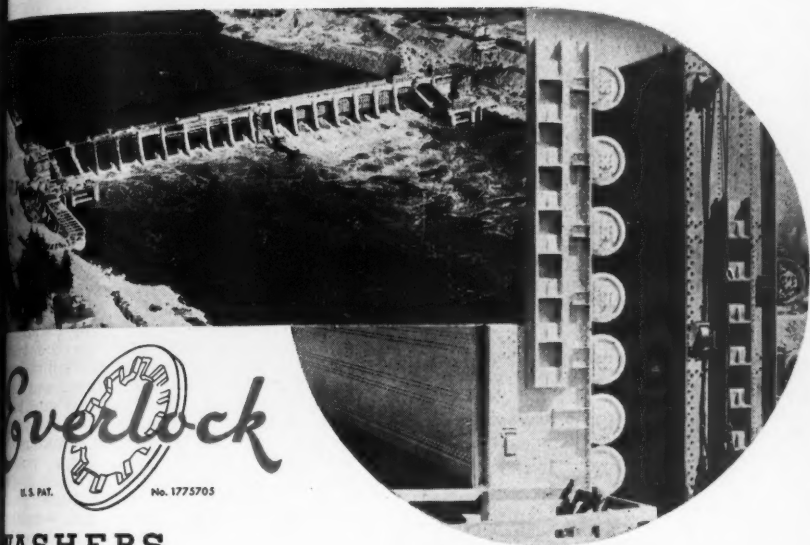
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wears the corners off, leaving the wheel practically circular.

In use, the grinder is held so that the edge of the wheel bears on the work. Although the cloth is coated with abrasive on only one side, the abrasive action is very effective.

The Haskins Method of Applying Screws and Nuts is the subject of a six-page circular now being distributed by R. G. Haskins Company, 4667 W. Fulton St., Chicago, Ill. According to the manufacturer, the simplicity and reliability of the Haskins method make it readily adaptable to assembly operations in practically all manufacturing plants. Four types of Haskins Power Drivers are illustrated, both by photographs of the units alone and by views of actual installations where the equipment is used. Copy free upon request.

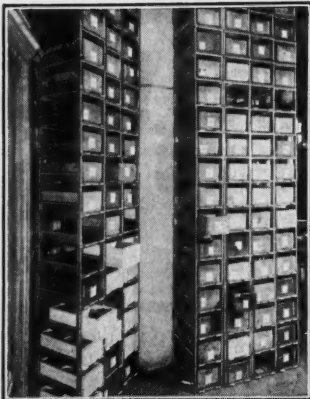
"The Travels of Modern Lubrication" is the title of an interesting bulletin which illustrates the many industries in which the Bijur Automatic Lubricating System is in use. The field of applications includes machine tools, business

machines, textile machinery, printing machinery, food machinery, bottling machines, sheet metal machinery, automotive industry machines, glass production machinery, and so on. This system of lubrication is said to be adapted practically every machine design in operating condition. Copy of the folder may be had by addressing a request to the Bijur Lubricating Corp., Long Island City, New York.

Oilgear Fluid Power Sideplate Press Bulletin 33101, now being issued by Oilgear Company, 1323 W. Bruce St., Milwaukee, Wis., covers Types PEC and PED Sideplate Presses of constant variable ram speed, in 3, 6, 10 and 15 ton capacities. According to the manufacturer, the rigid allsteel sideplate construction, compact fully enclosed operating mechanism, built-in oil and lubricant reservoirs, automatic protection against overload, simple, manual semi-automatic control, large polished ram guided in long bronze liner and movable work table make these presses modern in design, safety and versatility. Copy of Bulletin 33101 free upon request.

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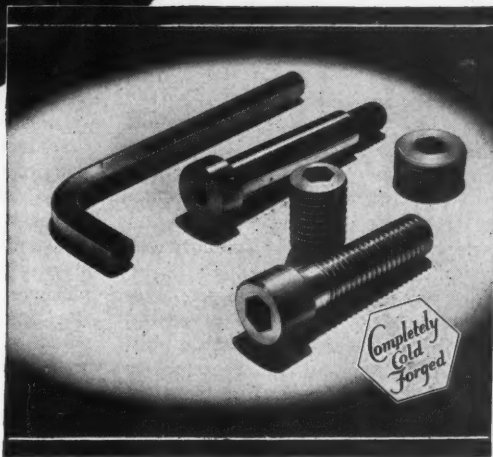
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H O L O - K R O M E

## Over the Editor's Desk

THIS issue of MODERN MACHINE SHOP marks the tenth anniversary of the birth of an idea—the idea that the manufacturing executives in machine shops and metal manufacturing plants throughout the country would welcome news of developments in their industry, concisely written, well illustrated, and presented in the form of a pocket-size magazine. How well the crystallization of this idea has filled a definite need can be estimated from the fact that whereas the first number, published in June, 1928, contained 64 pages, a recent issue required 272 pages to accommodate the editorial and advertising pages.

However, no one realizes better than we do that this growth could not have been attained without the support of the industry, and accordingly we want to take this opportunity to thank both our readers and our advertisers for their friendly co-operation.

While we are on the subject, perhaps our readers would be interested in knowing something about this publishing business and its relation to them and to the manufacturers of machine shop equipment. To begin with, in just the same manner as a workman's success depends upon his having a job—an opportunity for service—a business can succeed only where an opportunity for service exists, and the extent to which the business succeeds is dependent upon the extent and quality of the service. The "service" referred to consists, in the case of MODERN MACHINE SHOP, in presenting the stories of interesting plants, tools, devices, and operations in all parts of the United States and some foreign countries. Obviously, the task of gathering this material involves expense which must be

added to the expenses of publication—paper, printing, engravings with which the pictures are reproduced, and the current expenses of rent, light, salaries, and so on. All of these expenses amount to a considerable sum which must be met, and that is where the tool and equipment advertising comes in.

Ralph Waldo Emerson is credited with the statement that "if a man can build a better mouse-trap than his neighbor, the world will beat a path to his door." Mr. Emerson didn't put any time limit on the beating of that path, but the fact is that in his day the news of the mouse-trap would have been years traveling farther than the next village.

In Emerson's time there were comparatively few newspapers, and these circulated for the most part in local areas, due to lack of transportation facilities, the cost of paper and printing equipment, and so on. Photo engravings were still unknown, and pictures could be reproduced only by the use of engravings carved from wood by hand. Altogether, publicity was confined to such announcements as could be made by type in the few newspapers, by letter, and by personal contact. And the letters had to be hand-written.

Restricted publicity usually means restricted demand, and restricted demand means restricted volume. That is the case in the machine shop industry as it was known in Emerson's day consisted mostly of small shops, the force consisting perhaps of the owner alone, perhaps the owner and several employees. Tools were largely of the hand type, the manufacturing processes were slow, and the market was small.

Today the situation is changed. Power-driven machines have displaced hand labor, manufacturing pro-

processes are fast, and products are turned out at a high rate of speed. Emerson's mouse-trap maker were to walk into a modern novelty manufacturing plant, he would see mouse-trap parts being turned out at a rate of thousands an hour. He might see metal parts which in his day would have had to be pounded out by hours of hand labor formed to shape by one blow of a huge steam hammer. He might see a pair of shoes which would have taken his shoemaker perhaps a day to make turned out by machines in a few minutes. Without doubt his first question would be "Where is the market for these things?" And the answer is "Everywhere."

Our modern civilization is geared to a new standard of living. Before machine tools made the printing press possible in every locality, living was comparatively simple. Conventions were expensive, both because they were hard to make and because distribution was limited, and only the wealthy could afford them. But the modern paper machine and printing press, aided and abetted by modern manufacturing machinery, have changed all this.

A manufacturer brings out a new product today, and tomorrow—practically speaking—the story of the new development is known from coast to coast. A demand is created which makes it possible for him to employ high production machinery and thus cut the cost of his product down to a point which places it within the reach of everyone.

High production machinery, however, costs money to design and build, and when the demand for a product is too low to make such equipment economical, the cost of the product goes up. When the demand is high, on the other hand, the cost goes down in proportion. That is why a better automobile can be purchased today for

\$700 than could have been had twenty years ago for \$2000, and why a better electric refrigerator is available today at \$100 than could have been purchased twenty years ago for \$300.

Distribution is the answer, based on demand, which in turn is developed mostly by advertising. So a magazine such as this one is not only serving its readers by bringing to them stories of new engineering developments and manufacturing processes gathered from the four corners of the industrial world; it is also serving them by keeping them posted—through the advertisements—on the equipment and materials available for their use; it is providing a vehicle by which this information can be placed in the hands of the people most likely to be interested, and it is thus creating a demand which in turn is reflected in lower prices, a higher standard of living, and the employment of thousands of workers.

Now, just a word about the place of MODERN MACHINE SHOP in this picture. Our readers might be interested to know that last year this magazine carried more pages of advertising per issue, on the average, than any other industrial publication in America. The credit for this record, however, goes entirely to those of our readers who referred to this magazine when they wrote letters of inquiry to the manufacturers who advertise in its pages. It is the advertising that pays the freight, but it is the reader who dictates where that advertising shall be placed.

So again we thank those of our readers who, appreciating the effort we have made to give them the best and newest information available concerning their industry, have lent us their support and cooperation. With such support we can continue to forge ahead toward the goal of a bigger and better magazine for our readers' own use and benefit.

## New Shop Equipment

### Natco Cylinder Chamfering Machine

The illustration shows the Natco Cylinder Chamfering Machine developed by The National Automatic Tool Co., Richmond, Ind., for use in an automotive plant for chamfering the top and bottom of cylinder bores, as well as performing four drilling operations on the distributor pad and boss. The machine performs a total of twelve chamfering and four drilling operations.

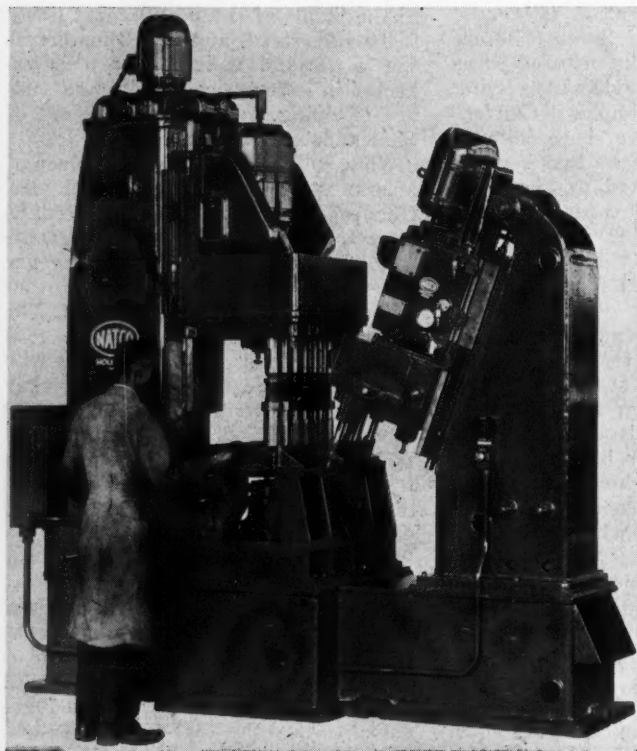
The unit is built of a Natco Vertical Holesteel Machine and a Natco Holeunit,

which is mounted at the proper angle. The Holesteel machine is arranged with a fixed center gear driven spindle box containing six heavy duty anti-friction bearing mounted spindles, complete with nose adjustment. The Holeunit is arranged with a four-spindle box of similar construction. Mounted on the steel base is a single stationary roller conveyor type fixture which holds the cylinder block while the required operations are performed.

One operator loads and unloads the fixture and operates the machine through the use of a single push-button station. The chamfering tools are of unique single point design, being placed in the cylinder bores. The top chamfering operation is performed by a revolving tool fed in a vertical plane, while the bottom chamfering operation is performed by a revolving tool fed in a horizontal (expanding) plane. One operator maintains a production of 60 blocks per hour under normal operation.

In the cycle of operations the vertical head chamfers the top and bottom of six cylinder bores. The angular head drills through the distributor boss with a 1/2-in. drill, drills two holes in the distributor pad and drills one gage hole.

The machine is built to the usual Natco standards of quality and the weight of the machine is 17,000 pounds.



Natco Cylinder Chamfering Machine

## Dresses Floor Type Horizontal Drilling, Boring and Milling Machine

The Dresses Machine Tool Company, Cincinnati, Ohio, has developed a new line of full anti-friction bearing horizontal drilling, boring and milling machines in floor types, stationary table types,

existing table types and compound table types. The illustration shows a standard floor type machine having a vertical travel of spindle head of 48 in. and a horizontal travel of column of 40 in. A unique development is that the standard spindle head and column can be adapted to existing floor type runways. This spindle head contains the entire spindle speed change gears, the feed change gears, the feed distribution functions and a reversible motor, change mounted. The outstanding feature of the head is that while a single spindle is used, maximum spindle speeds of 1420 are available.

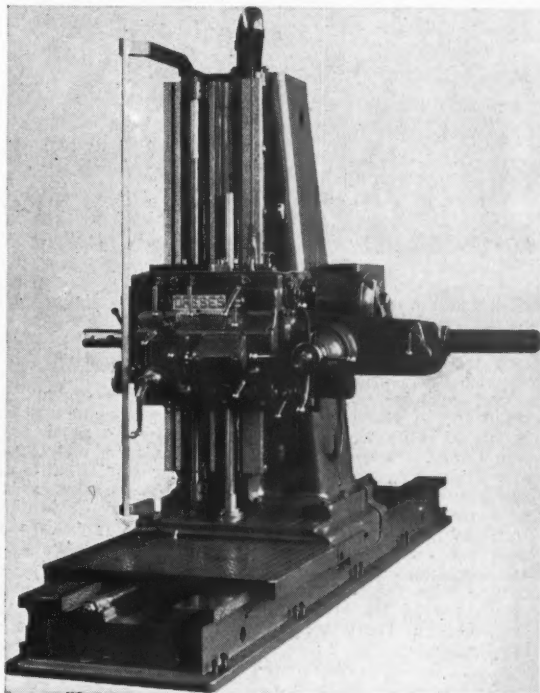
All speeds pass through a single hardened nitralloy spindle, thus allowing full travel or feed (30 in.) to be used for all speeds. Spindle speeds as high as 1420 r.p.m. are available. Built-in reversing motor mounted on head. No bevel gears are used. Only 17 gears are used to secure 24 speeds and only two pairs are in mesh for any one speed.

Spindle drive mechanism gears are carburized. They are finish-cut by the cross-hatched method and are cross-lapped after hardening for the final finishing operation. Precision ball bearing spindle with two bearings at front end and one bearing at the rear end. Machine is completely anti-friction bearing equipped including spindle drive mechanism, feed change and feed distribution mechanism, hand adjustment shafts, table and saddle clamp shafts, and even the counterweight sheaves.

Among the outstanding features of design are the entire control for starting, stopping and reversing spindle; spindle speed changes, feed changes; all feed reverse; power rapid traverse to all units including spindle, hand movements in-

cluding dials to spindle, head, column (Types A-B-C), table and saddle (Type D) and feed distribution to spindle and to head and column (Types A-B-C).

Head is completely enclosed and all mechanism is automatically oiled from a positive driven pump. Other units operate in an oil bath or receive their lubrication from a one shot pressure system.

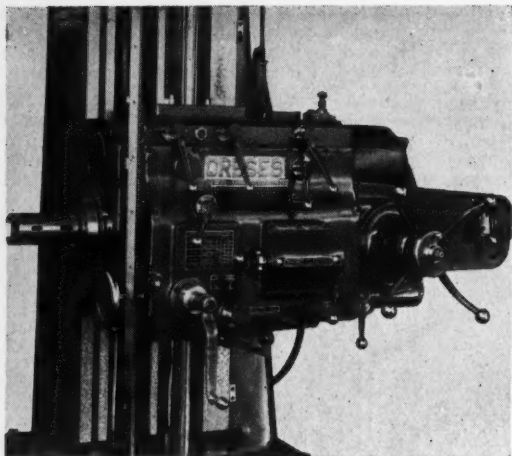


Dresses Floor Type Horizontal Drilling, Boring and Milling Machine

Large diameter Acme thread screws are used for feeding all units except spindle.

General specifications of the various units are: head, 24 spindle speeds providing a choice of 12 to 700 r.p.m. or 16½ to 1000 r.p.m. or 24 to 1420 r.p.m. Special modification of these spreads can be furnished. Spindle, 3½-in. diameter, hardened Nitralloy, with 30-in. continuous feed. Eight boring and drilling feeds to spindle. Eight milling feeds to head and column. Sixteen milling feeds to head, table and saddle, compound table type machine. Vertical travel of spindle head, 24, 36, 48, 60 and 72 inches. Column runways: column travel on run-





The Dresses spindle head contains the entire spindle speed change gears, the feed change gears, the feed distribution functions and a reversible motor, flange-mounted. Spindle speeds of 1420 r.p.m. are available.

and built especially for boring large heavy work such as spindle carriers for screw machines, workheads, driving heads and cutter heads for gear cutting machines, and for lathe head stocks.

The No. 45 is a massive, powerful machine, which can be furnished in either single end or double end type for boring from one end or from both

ways from a minimum of 24 in. to any maximum, increment of travel being 12 inches.

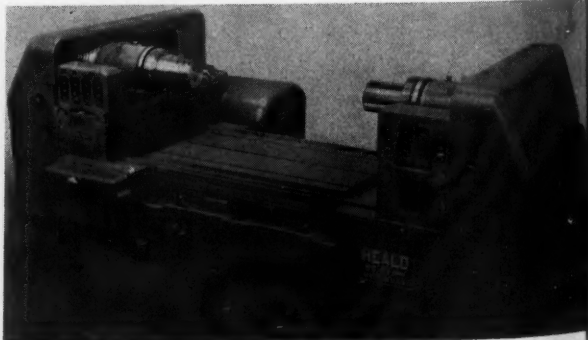
Stationary tables are available in various sizes and sliding tables mounted on a bed can be furnished in sizes from 30x30 in. to 48x84 in. Excepting for the 30x30-in. table which has hand adjustment only, these units can be arranged with hand adjustment or power feed or power rapid traverse. Compound tables, consisting of a standard table mounted on a saddle, also can be furnished. Table sizes are 38x60, 38x72, 48x60 and 48x72 in. working surface. A trough is cast around the table for coolant. Beds for tables are 36 in. over the ways and are available in three lengths: 72, 96 and 120 inches.

ends. Boring heads are mounted on the bridge which has capacity for holding from three to seven heads, depending on their size. The heads are driven by V-belts and speeds can be easily varied simply by changing pulleys. The table has a large scraped pan with three T-slots for holding fixtures. The table is only 22 in. from the floor, thus greatly facilitating loading. The table slides on flat and V-ways of ample area and is driven by a hydraulic system which provides a wide range of feeds.

At each end of the machine the boring heads are driven by individual D.C. motors which, with their own jackshafts, are mounted on separate sub-bases at the rear of the machine. Motors are of the variable speed type controlled by

### Heald No. 45 Double End Bore-Matic Precision Boring Machine

A precision boring machine, to be known as the No. 45 Double End Bore-Matic, has been added to the line of Bore-Matics manufactured by The Heald Machine Company, Worcester, Mass. The machine was designed



Heald No. 45 Double End Bore-Matic



# HIGH EFFICIENCY AIR POWER

*-today-tomorrow-and next year*

Simple outside adjustment of the piston packing in Hannifin "Leak-proof" Air Cylinders allows maintaining the original high efficiency piston seal throughout the entire life of the packing. Maximum utilization of air power, without leakage or troublesome maintenance, is consistently obtained.

Correct adjustment of the soft, graphite treated piston packing is made from outside the cylinder without disturbing any other parts. The adjusting nut and tube are an integral assembly locked in position on the end of the piston rod. There can be no end play as the packing wears.

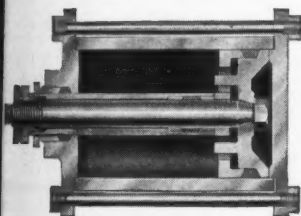
Cylinder bores are ground and honed, and with the efficient piston seal insure maximum power without waste of air.

Hannifin Air Cylinders are built in a complete range of standard types and mountings, sizes  $1\frac{1}{2}$  to 16 in. diameter, for any length stroke. Larger sizes built to order. Single acting and double acting types, with air cushion at either or both ends if required.

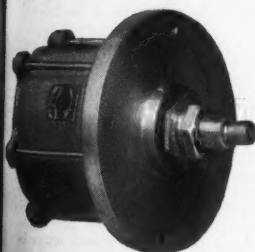
**HANNIFIN MANUFACTURING COMPANY**  
621-631 South Kolmar Avenue, Chicago, Illinois

## HANNIFIN

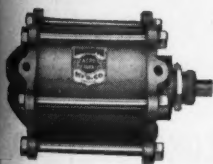
### IMPROVED AIR CYLINDERS



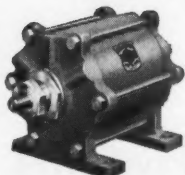
Sectional view



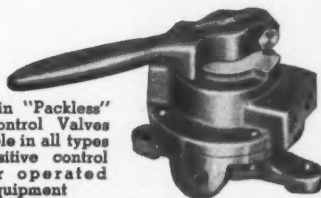
Model JR—double acting air cylinder



Model BR—double acting air cylinder



Model CR—double acting air cylinder



Hannifin "Packless" Air Control Valves available in all types for positive control of air operated equipment

ENGINEERS • DESIGNERS • MANUFACTURERS • Pneumatic and Hydraulic Production Tool Equipment

a rheostat at the front of the machine for varying the speed of the boring heads. Starting and stopping of the boring heads is controlled by push buttons in individual control panels on the bridges at the front of the machine. The push buttons allow the boring heads to be placed under automatic control or to be jogged, which is convenient in setting up. The control panels also provide push buttons for controlling the main drive motor, and starting, stopping and reversing the table.

The No. 45 has ample capacity to handle several sizes of headstocks. The table is 104 in. long by 36 in. wide with a scraped pad 54 by 28 in. Both bridges are set back on the pads of the machine base to give a distance of 70 3/4 in. between bridges. Boring heads are mounted on raising blocks. The machine has a stroke of 30 in. Net weight with four heads is 19,590 lbs. A floor space of 84 by 144 in. is required.

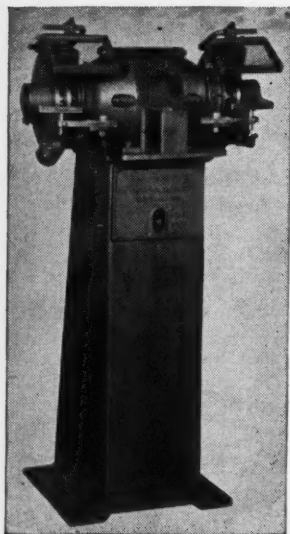
### Oilgear 300-Ton Two-Column Speed Press

Malleable iron castings can be die straightened under a cushioned compelling squeeze to the proper shape at close

tolerances on the 300-Ton Two-Column Speed Press manufactured by The Oilgear Company, 1323 W. Bruce St., Milwaukee, Wis., and illustrated herewith.

This high speed press features Oilgear fluid power with rapid approach and return ram speed, sensitive control of the rapid traverse and pressing variable ram movement, and automatic unloading of the pump discharge at a predetermined adjustable tonnage. It minimizes the press time not actually spent in straightening the parts, subjects the casting to a cushioned compelling squeeze between dies, and holds pressure on the metal between the dies long enough for the metal to flow into its new alignment.

The rigid main press structure, consisting of the base, side frames, yoke and oil reservoir, is uniformly welded into one compact piece weighing 17,500 lbs. Heavy steel plates, each with a large center cut-out, are used in the front and back of the frame. These are connected by welded plates forming rigid box-type side frames and a substantially ribbed base and yoke. A large bottle-type steel cylinder weighing 3000 lbs. is built into the press yoke and is equipped with a guided ram and piston weighing 3300 lbs. The rapid traverse cylinder is built in the main piston and



## GRINDERS and BUFFERS

Prices of Grinders and Buffers vary over a wide range, depending on details of construction. Our line of standard machines has been developed to provide for suitable designs at THE LEAST INVESTMENT for each application.

Whether your requirements call for intermittent duty, heavy continuous duty, or unusual intermittent overload conditions with either normal or wide distance between wheels, we have designs for your particular specifications. The following machines are powerful, fast-cutting, pedestal-type designs for intermittent duty. They are furnished with WELDED STEEL, safety type wheel guards and are ideal for miscellaneous shop grinding.

HP	Speed	Wheel Size	Price
2	1800	12"x1 1/2"	\$158
3	1800	12"x2"	\$168
4	1800	14"x2"	\$210

Reduce your grinding expenses by locating these machines close to your high-priced operators.

**THE PRODUCTION EQUIPMENT CO.**  
CLEVELAND OHIO

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The Oil-  
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# PRECISION TAPPING EQUIPMENT

## plus

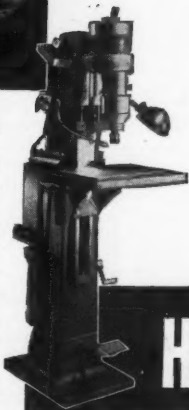


An important part of the Haskins Method is the designing of fixtures that insure the user maximum profit from the exclusive advantages of the Haskins Tapper.

Tapping jobs of practically all kinds are now being done faster and more economically because of these two factors—skill and experience of Haskins Engineers—speed and precision of the Haskins Tapper. Would you like, without obligation, to see proof of how the Haskins Method can improve tapping production in your plant? Write to R. G. Haskins Company, 4667 W. Fulton Street, Chicago, for full details.

### FOR EXAMPLE

Tapping brass back plates of an electric automobile clock to extremely close tolerances. A simple slide fixture, designed by Haskins Engineers, and the sensitive Haskins tap head, eliminating the necessity of a hold-down, more than double production. The fixture moves in a fixed guide against stops at both ends so that the operator need not line up the hole for tapping.



## HASKINS Precision Tapping Equipment

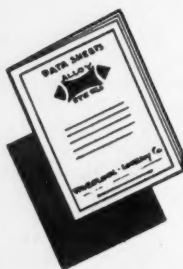
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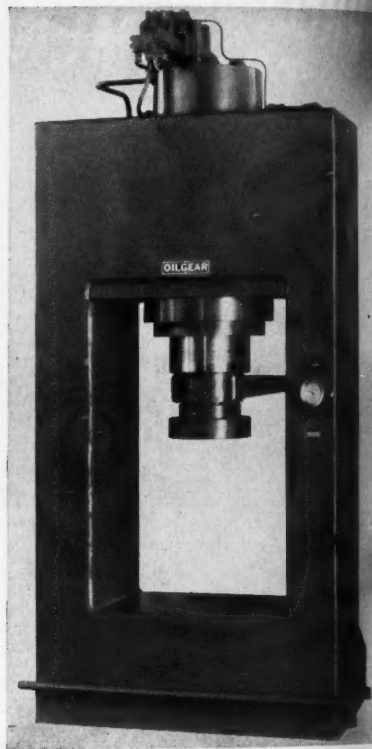


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**Wheelock, Lovejoy & Co., Inc.**

**130 Sidney St. Cambridge, Mass.**  
**CLEVELAND CHICAGO NEWARK**  
**DETROIT BUFFALO**

ram with the piston rod fixed to the top of the main cylinder. An Oilgear surge valve flanged integral with the main cylinder provides a free flow of oil to the main cylinder during the rapid traverse cycle. Smooth fluid power operation is



**Oilgear 300-Ton Two-Column Speed Press**

provided by an Oilgear Type DHP-2025 Two-Way Variable Delivery Pump direct-connected to a 15 h.p., 1140 r.p.m. electric motor and mounted on the reservoir integral with the back of the press.

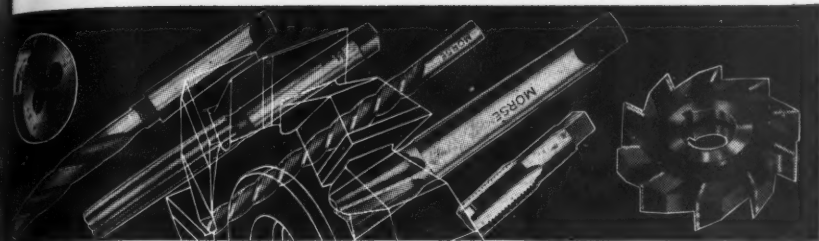
In operation, depressing the hand lever or foot treadle causes the ram to approach the work rapidly and then automatically slow down to pressing or full tonnage speed when the work is reached. The ram continues downward until maximum tonnage or positive stop is reached, and will maintain full tonnage on the work until the operator releases the hand lever or foot treadle without excessive heating or power loss. The oper-

The Mo  
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High Speed  
DRILLS  
REAMERS  
CUTTERS  
TAPS AND  
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Are "invisible values" slashing away at your production costs? They are if you use Morse Tools. The "invisible values" are Morse Extra Values — hidden in every tool that bears the Morse trade-mark; years of manufacturing experience, carefully-controlled heat treating, accurate grinding, step-by-step inspection. Let Morse Extra Values prove themselves in your own shop. Morse Laboratory technicians will gladly cooperate with you on any problem.

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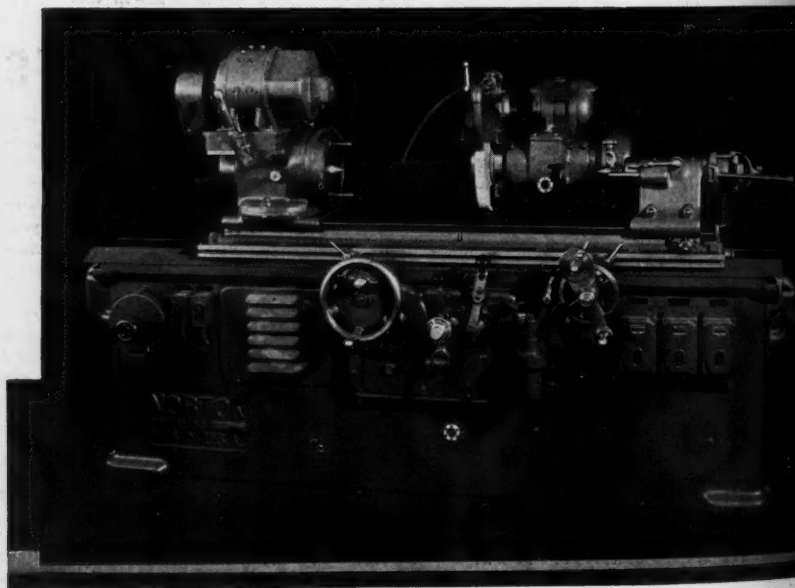
**U**NIVERSAL construction with production grinder performance. Designed not for the tool room alone but for manufacturing operations where the volume of duplicate parts is insufficient to make the use of several more specialized grinders economical.

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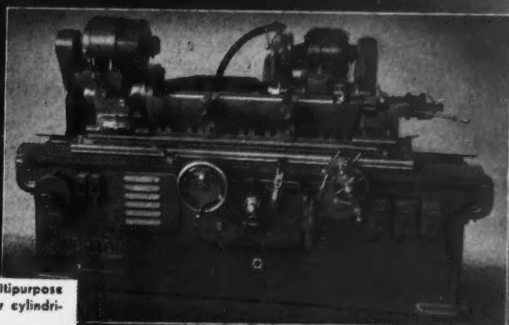
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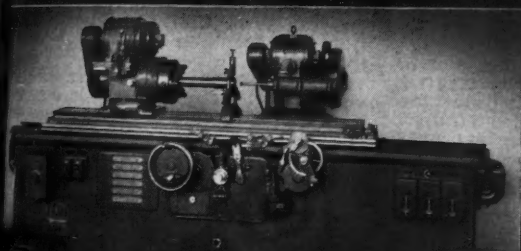
Cleveland



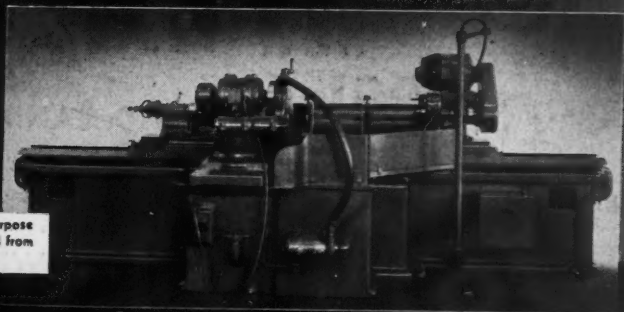




**12" x 36" Multipurpose**  
set up for cylindrical  
grinding.



**14" x 43" Multipurpose**  
set up for internal  
grinding.



**14" x 72" Multipurpose**  
photographed from  
side.

**ORTON GRINDERS**

ator can inch, reverse or stop the ram at will. By adjusting the pump unloading control, the maximum working force of the press can be reduced for lighter work.

General specifications of the press are as follows: capacity, 100 to 300 tons; stroke, 24 in.; daylight space, 42 in.; rapid traverse down, variable, maximum per minute, 220 in.; rapid traverse up, variable, maximum per minute, 250 in.; pressing speed down, variable, maximum per minute, 15 in.; floor to top of base, 24 in.; width between columns, 42 in.; base, front to back, 30 in.; overall height, 148 in.; width, right to left, 74 in.; depth, front to back, 66 in.; net weight, 26,500 pounds.

### Packer No. 2 Straight Line Conveyor Type Polishing and Buffing Machine

The Packer Company, Meriden, Conn., has recently placed on the market an automatic polishing and buffing machine to be designated as the "No. 2 Straight Line Conveyor Type Polishing and Buffing Machine" for the finishing of a variety of small parts. This machine

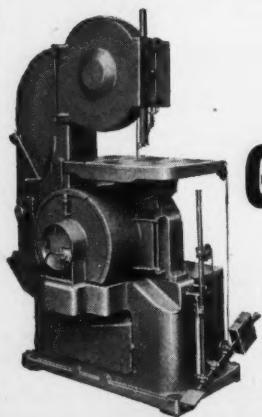
is of the conveyor type and employs a new style of exterior design, namely that of shielding against abrasive dust. The general appearance of the machine is smooth and graceful, with only the hand wheel controls projecting from the body design.

The size of the No. 2 Straight Line Conveyor Type Machine shown herewith is 30 ft. 6 in. long and 4 ft. 6 in. wide. This newly designed machine can be furnished with any number of wheel heads depending upon the customer's requirements, thereby increasing or shortening the length of the machine.

The wheelheads are known as the Packer No. 6500 Universal Type, with adjustments for setting the wheels at any angle from horizontal to vertical or any angle within 90 degrees. The wheelheads are arranged with spring balance plates, thus providing a flowing action to the wheels to compensate for any lack of uniformity in thickness of the part to be finished and also permitting the finishing of work in various thicknesses.

The wheelheads can be furnished with motors of various horsepower depending upon the customer's requirements, and are also supplied with direct drive wheels or multi-"V" belt driven wheel spindles which are said to permit change

## MODERN DIE-MAKING MACHINES



# NEW EFFICIENCY NEW PERFORMANCE GROB OPEN END BAND SAWS

Never has there been a Metal Band Saw with so many practical features built into it . . . features that mean speed, accuracy and economy in die-making. Here is a machine that will handle heavy massive dies or small delicate ones with equal ease and precision.

## NO BRAZING NO WELDING

Let us prove to you that this Model OS-20 will saw out dies from 25% to 100% faster than any other die-saw.

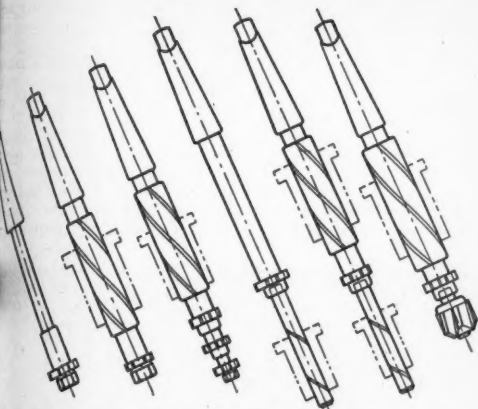
Send for complete detailed catalog.

**GROB BROTHERS**  
GRAFTON, WISCONSIN

# NATIONAL BOREAMER

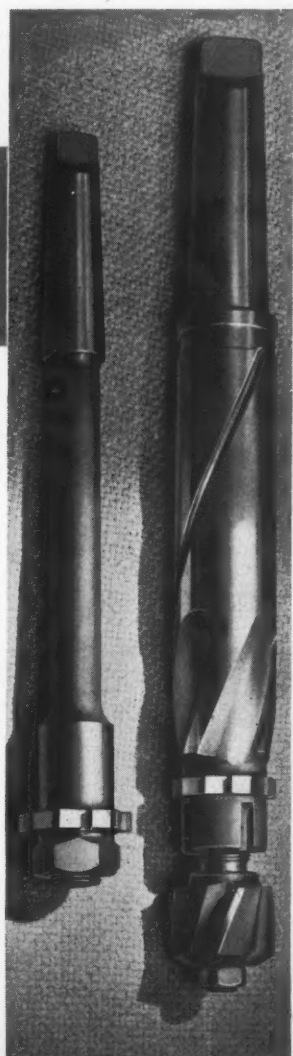
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Combine the concentric accuracy of Boring with the surface smoothness of Reaming. •• Remarkably long grinding life and economical replacements are uniformly reported by users. •• Recommended designs of Boreamer equipment will be submitted upon receipt of particulars.



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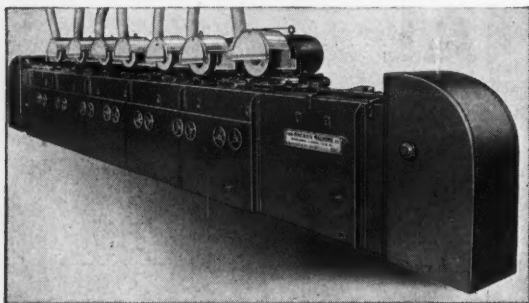
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**Packer No. 2 Straight Line Conveyor Type Polishing and Buffing Machine**

ing the speed of the wheels necessary for various metals and finishings.

The adjustment for the changing of the position of the wheels is mounted on the front side of the conveyor, as shown in the illustration, permitting the operator to adjust each wheel according to his requirements from the working station or the operating position of the machine.

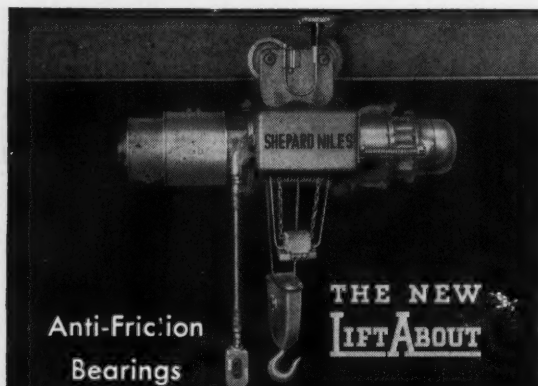
The conveyor chain is driven by a variable speed unit which permits chang-

ing of the speed of the conveyor by adjustment of control on the drive unit itself. The changing of the speed can be done very quickly by the operator.

All important moving parts on this machine are ball bearing constructed. The carriers to which the work holding fixtures are fastened travel on a solid machine surface track and each carrier is equipped with grease sealed, dust-proof ball bearing rollers. All working parts of the machine are shielded against dirt or abrasive material coming in contact with moving parts.

### **Linley High Speed Vertical Bench Milling Machine**

A high speed vertical bench milling machine equipped with screw feed micrometer quill has been brought out by Linley Brothers Co., 583 Fairfield Ave. Bridgeport, Conn. The screw feed quill is said to assure smooth and accurate boring to any predetermined depth up to



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Originated 8 years ago, the Handee is recognized today by mechanics and craftsmen everywhere as the finest, fastest, most powerful tool for its type and weight, 12 ounces.

Uses 200 different accessories, quickly interchangeable in easy-working chuck.

Actually, a Whole Shop full of Tools in One. And, it's portable, so you can take it to any job, plug in AC or DC socket, 110 volts, and go to work.

A real time and money saver in factories, repair shops, model and tool rooms, in laboratories, etc. Used for precision work on delicate mechanisms—to repair machine parts without dismantling machine — on the production line, for work on all metals, alloys, glass, resins, composition materials, wood, bone, stone, etc.

Try a Handee. Note its speed, its silent, smooth performance, and its almost human response to your touch.

Order Today on 10-Days Trial  
or send for Catalog.

**CHICAGO WHEEL & MFG. CO.**

1101 W. Monroe St. Dept. 00 Chicago, Ill.

M. M. S. 6

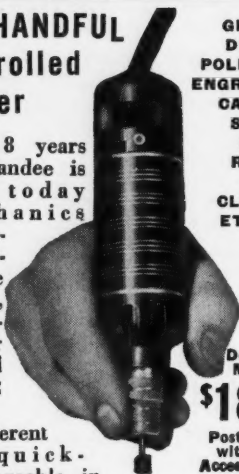
- ☐ Send Catalog  
☐ Send De Luxe Handee on 10-Days Trial

Name .....

Address .....

City..... State.....

GRINDS  
DRILLS  
POLISHES  
ENGRAVES  
CARVES  
SANDES  
SAWS  
ROUTS  
CUTS  
CLEANS  
ETC.



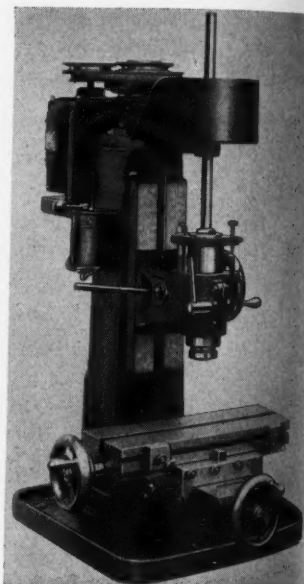
De Luxe  
Model

**\$18.50**

Postpaid  
with 8  
Accessories

3 in., and the direct reading feature eliminates possible errors in calculation.

A 10 pitch screw running parallel to its upper end serves as the feeding member. A bronze nut fitting the screw and having spiral teeth on the outside meshes with the hardened and ground spiral gear which is keyed to a horizontal shaft on the opposite end which is the hand wheel. The wheel is equipped with a dial of 2½-in. diameter.



Linley High Speed Vertical Bench Milling Machine

graduated in thousandths of an inch and having a vernier reading in tenths of thousandth. A depth stop gauge located in front of the quill is graduated with 10 lines to the inch and one turn of the hand wheel equals one space or 0.1 in. on this gage.

To machine a piece of work to a predetermined depth, the cutting tool is first brought into contact with the work in the usual manner, the depth stop gage is set to any even line and the compensator screw above is brought in contact with it and locked. The dial is set at zero and the depth stop gage lowered to the nearest hundred thousandth. The feeding is then carried forward until the compensator screw is again in

"Super  
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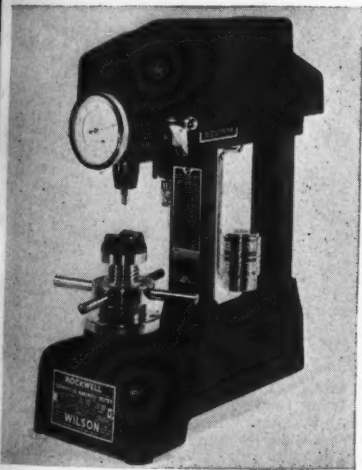
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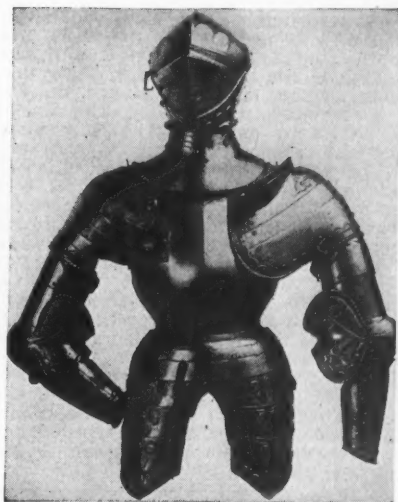
## "ROCKWELL" HARDNESS TESTER

WHILE modern hardness testing is done with our machines it is well to remember that intense and serious interest and effort in metal testing goes back thousands of years—goes back it is true only for the testing of armor and armament, but civilization at this moment is so crazy that metal testing for war purposes almost equals in amount metal testing for other purposes. We know that, because our testers are in extensive use in practically all the arsenals of Europe and the Orient, as well as in this country, for high precision testing is demanded on that work.

According to Samuel, David refused to wear armor given him by Saul because it had not been "proved".



*"Superficial" Type of "ROCKWELL" Hardness Tester for use where indentation must be very shallow.*



*Armor of about the year 1540*

According to Plutarch, Demetrius himself at the time of the siege of Rhodes (306 B. C.) permitted Zwiros the armorer to test a new corselet with bolts from a catapult at twenty paces, Demetrius himself wearing the corselet during the test. They were brave men full of faith in those days as men are today when they try out a new airplane.

The armorer chose his iron according to its source, for he neither knew nor could control its chemistry. He did annealing, cold working, hardening, tempering and carburizing and you may be sure that the man who did those things had some means of his own for testing before he let his patron stand before a catapult to reassure himself that his purchase was armor of good "proof".

**WILSON**  
MECHANICAL INSTRUMENT CO. INC.

CONCORD AVE. & 143 ST., N.Y.

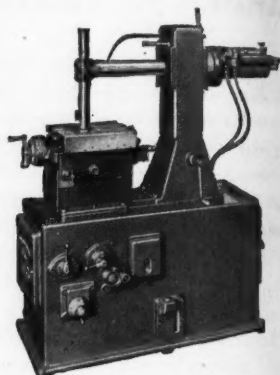
contact with the depth stop, which will give a zero reading on the dial. The depth stop is then released and the feeding is continued the remaining distance, which is clearly shown on the dial without any calculation. The vernier is always in use with the micrometer dial and extremely accurate work is said to be produced without any previous calculation. The total quill travel is 3 in. and 10 turns of the hand wheel are required for each inch of travel, providing a very smooth feed.

The table has a working surface  $14\frac{1}{2} \times 5\frac{1}{2}$  in. with a  $\frac{1}{2}$ -in. T-slot through the center. The longitudinal travel of the table is 10 in.; cross travel, 5 in. The screws are fitted with replaceable bronze nuts. Standard equipment includes a  $\frac{1}{3}$  h.p., 1725 r.p.m. ball bearing motor, either single phase, 60 cycle, 110 or 200 volt capacitor start type, or three phase, 50 or 60 cycle, 220 volt type. Motors having other characteristics can be furnished. Shipping weight, 430 pounds.

### Nixon Hydraulic Multi-Purpose Vertical Shaper

Designed for rapid production of small quantity work such as is produced in tool rooms, jobbing shops and maintenance

departments, the Nixon Hydraulic Multi-Purpose Vertical Shaper shown here permits the use of inexpensive tools



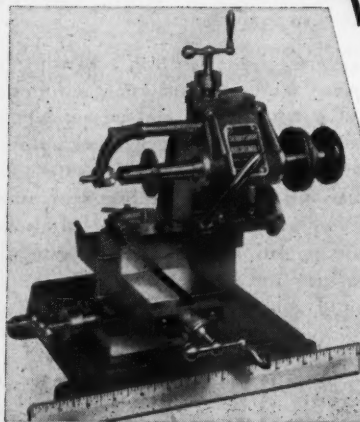
Nixon Hydraulic Multi-Purpose Vertical Shaper

in the cutting of keyways, saw broaching, vertical shaping, and so on. The shaper is a product of the Nixon Gear & Machine Company, Inc., Syracuse, N. Y.

The shaper is particularly adapted for

## THE NEW DERBYSHIRE MICROMILL

DESIGNED ESPECIALLY FOR SMALL WORK



### Special features

Cutter Spindle and Bearings, tool steel hardened and ground.   
 Oil Reservoir.   
 Optional Styles: Lever Cam Feed for Table Slide and Rack Slide.   
 Adjustable Over-arm support for Table Slide.   
 Headstock Slide and special type fixtures.   
 Write for full information.

### SPECIFICATIONS MODEL 65

Vertical micrometer feed	44 m/m	1.73"
Vertical lever feed	25 m/m	.984"
Cross feed of table	32 m/m	1.26"
Longitudinal feed	80 m/m	3.15"
Maximum distance spindle to table	75 m/m	2.95"
Minimum distance spindle to table	10 m/m	.393"
All feeds with micrometer adjustment to .001"		
Table $2\frac{3}{8} \times 6\frac{7}{8}$ "	Base $7\frac{1}{2} \times 8\frac{1}{2}$ "	
Height to top of column is 8"	Wt. 36 lbs. less fixture	
Model No. 943 countershaft, self oiling bronze bearings		
Special mount 1-5/16" diameter shaft		
Foot treadle operated		

F. W. DERBYSHIRE, INC. WALTHAM, MASSACHUSETTS, U. S. A.

Hydraulic  
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DEL 65

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2.95"  
3.93"  
1"

to fix  
bearing

S. A.

# STRENES METAL

## Licensed to No Other Foundry

There's a reason why we have consistently refused to license the manufacture of cast-to-shape Strenes metal. Frankly, experience has shown that licensee foundries are unable to make any metal as good as can the licensor. Knowing this, Advance Foundry makes the entire output of Strenes metal. By so doing, we are able to supervise every melt and assure uniform, high quality.

### Why You Can Profitably Use Strenes C (formerly 71-C)

Drawing and forming dies of Strenes metal are 30% to 50% less expensive. Not only is the metal itself less costly, but casting it to shape (to surprisingly accurate limits) gives additional savings. Strenes dies virtually eliminate the need for Kellerizing, machine finishing, and the use of steel inserts.

Strenes dies require only 1/3 to 1/6 the stoning and polishing of higher priced die metals because they don't gaul or "pick-up". And due to the deflection factor of Strenes, they don't break.

Long life is another Strenes metal characteristic. A typical example is a refrigerator top die which produced 850,000 stampings out of .050 material and still remained in excellent condition. Strenes dies produce few imperfect stampings because of the unexcelled graphitic surface lubrication (especially noticeable on difficult draws).

### Look Over This Guarantee

Strenes metal (formerly 71-C) is being successfully used in many fields. So confident are we that it will fully meet your most rigid requirements that we will make your die a trial. Send in your blueprints or patterns for preliminary estimates. But whether you do this or not, write for free descriptive bulletin.

**THE ADVANCE FOUNDRY CO., Dayton, Ohio**

REPRESENTATIVES: W. R. McDonough & Co., National Bldg., Cleveland, Ohio • F. W. Peterson, 210 Woodward Ave., Detroit, Michigan • Fred H. McGee, 917 Carter St., Chattanooga, Tennessee • James T. Osborne, 6037 Park Ave., Indianapolis, Ind.



### SCOOTER FOOTBOARD DIE SET

Cast-to-shape out of Strenes C (formerly 71-C). 32" x 3 1/2" stamping drawn from a develop blank. 1/16" material. 1 1/2" draw with beads drawn from 1/16" to 5/16". Designed and built by the Lincoln Eng. & Tool Co., Dayton, O.

the surface broaching of small parts of the type that are usually milled. An indexing work holding fixture can be used for rapid production. The quick set-up time and ease of operation accommodates the machine to a wide variety of work.

The cutter bar is moved vertically by a hydraulic cylinder located under the bar, thereby providing a straight pull on the tool and guide bars. The length and placement of the stock are controlled by two stops located on the outside of the machine. The stroke can easily be reversed at any point and the speed of the down or cutting stroke can be varied to suit conditions although the return stroke remains constant. The bar can be stopped automatically at either end of the stroke, or upon the completion of a cycle, or can be set to run continuously.

On the up stroke, the table pulls away from the bar, allowing the cutter to completely leave the cut, the table being operated hydraulically and synchronized with the bar movement. Hydraulic feed to the table can be supplied, the feed being adjustable from 0.002 to 0.015 in. per cut. On the feed movement, the bar support arm is moved hydraulically against a positive stop and the length of return is controlled by an ad-

justable stop, which speeds up the time required to change pieces. The table can be tilted, by worm gear, 5 deg. away from the level for cutting taper keyways or keyways in taper bores. Accuracy in depth of cut is obtained by means of a large diameter dial, reading in thousandths.

A coolant system is provided, and the hydraulic oil reservoir in the base of the machine is easily filled from the outside. The bed is of heavy cast iron box construction, housing the motor, pump, tanks and all necessary piping. The unit is self-contained. The hydraulic pump is powered by a 5 h.p., 1200 r.p.m. motor.

The machine is made in two sizes, No. 3 and No. 4, with lengths of stroke of 6 in. and 12 in. respectively. The work table is 14x13 in. for the No. 3 and 24x20 in. for the No. 4. Center of keyway to columns, both sizes, 17 in. Height of table from floor, No. 3, 40 in. and No. 4, 44 in. Floor space required, 5x2 ft. Shipping weight, No. 3, 1750 lbs. No. 4, 1850 pounds.

### Hisey Tex-Drive Wet Grinder

The Hisey-Wolf Machine Co., Cincinnati, Ohio, is now marketing a Tex-Drive Wet Grinder designed to employ 16, 18,

## MANAGEMENT AND LABOR Agree



- 1—That the hinged-lid metal boxes in which STAR hand hack saw blades now are packed are a real help.
- 2—That to the well-known cutting and lasting qualities of the famous copper-finished blades, the new container adds convenience and protection. The boxes are handy even after the blades have been used.

CLEMON BROS. INC.,  
MIDDLETOWN, N. Y.



# STAR HACK SAW BLADES

HAND AND POWER—TUNGSTEN AND "MOLY"

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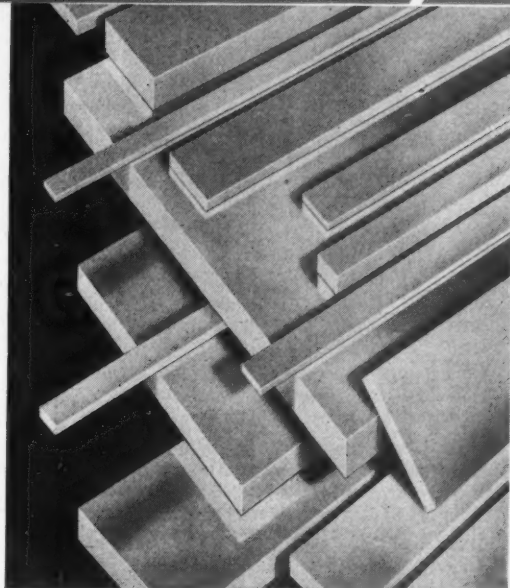
EASY TO OBTAIN

Quickly-

## UNION Advanced COLD DRAWN FLATS

*that now offer you the  
highest development of*

Bright, attractive finish  
Flat, smooth surfaces  
Sharp, square corners  
Parallel sides  
Accuracy to size  
Cross sectional accuracy  
Straightness  
Bar-after-bar uniformity  
Workability  
Machinability  
Tensile Strength

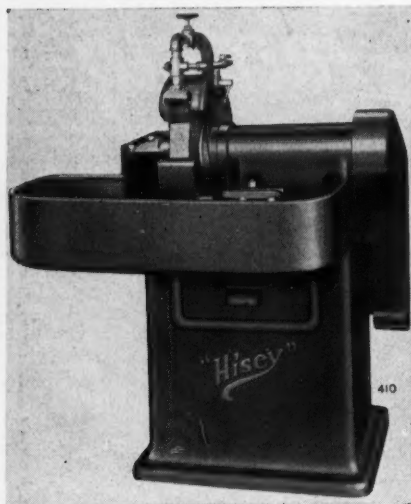


★ An extensive cycle of improvements advances these flats—and advances your interests. Wherever you have need for rectangular bars up to 12 inches wide, Union Advanced Cold Drawn Flats will meet your requirements with maximum satisfaction and at lowest cost. Produced to standard manufacturing tolerances providing close limits of size variation undersize to exact size only, they simplify assembly. Oversize tolerance is not permitted except on special order.

Union Advanced Cold Drawn Flats are easy to obtain—quickly—from your nearby Union Drawn Distributor. He carries a wide variety of popular sizes in stock at all times. Call him when you need flats or any other cold drawn shape.



# UNION COLD DRAWN STEELS



Hisey Tex-Drive Wet Grinder

20 or 24-in. wheels. The grinder is equipped with a splash bowl and coolant system which is said to eliminate neces-

sity for a dust collecting system due to the fact that the water carries with it all dust and grit. The machine is entirely self-contained with a built-in pump and large concealed reservoir. The same water is used over and over, a separator removing the grit before returning the water to the reservoir. The separator is easily removed for cleaning and the reservoir is easily accessible for flushing.

The self-priming pump is driven by V-belt from the spindle and the flow of water is controlled by a convenient valve on top of the guard. The machine can be furnished without motor or with 220, 440 or 550 volt, 50 or 60 cycle, two or three phase motor. The wheel sizes are 16x3, 18x3, 20x3 or 24x3 in. and the spindle speeds, no load, are 1400, 1300, 1160 and 960 r.p.m. Height to the center of spindle is 42 in. and the size of the base at the bottom is 24x30 in. for the two smaller sizes and 30x34 in. for the two larger sizes. Weight with motor ranges from 1000 to 1500 pounds.

### Federal Multi-Pin Clutch

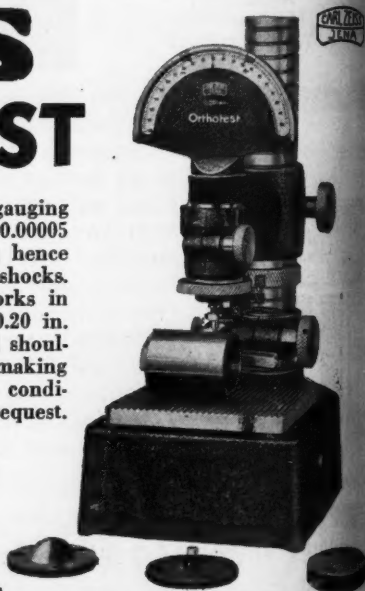
A clutch of improved design has been developed by the Federal Press Company, Elkhart, Ind., and is now available in

# ZEISS ORTHOTEST

For external and internal precision gauging of round and flat work. Accuracy 0.00005 in. No knife edges in transmission; hence no wear. Plunger not sensitive to shocks. Unbreakable crystal over scale. Works in any position. Free lift of plunger 0.20 in. for measuring in grooves and behind shoulders. Compact and rugged design, making instrument ideal for use under shop conditions. Catalog Fe 170 free upon request.

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485 FIFTH AVE., NEW YORK

728 So. Hill St., Los Angeles  
Representatives in Principal Cities





Do YOU Have a Wear Problem  
in any of these Applications?

# XALLOY

*may be the Solution!*

Xaloy has been successful in increasing the life of bearing surfaces in many cases where the problem has been considered "impossible." On certain applications to sleeves, rolls, and dies this increase in life has amounted to as much as ten times the life of the previously used material. Yet the cost of the Xaloy application was such as to represent important savings over the previously used material.

Xaloy is now applicable to flat and irregular shapes as well as cylindrical shapes. By a newly developed fusing process it may be applied practically and economically to both maintenance and production parts.

If you have a difficult wear or corrosion problem, it is worth your while to investigate Xaloy, Wilrich 600, Wilrich 350, and Wilrich 300. Your inquiries are invited and will receive immediate attention.

## Send for Your Free Copy of "HARD FACTS"

This Illustrated Monthly Publication brings you Interesting Information about XALLOY —its Applications, Service Records, etc. We shall be glad to place your name on the mailing list.

**WILCOX-RICH**  
Division of  
**EATON MFG. COMPANY**  
DETROIT



DIES



SEALS



ROLLS

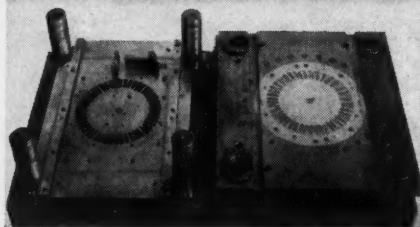


CYLINDER  
SLEEVES



BUSHINGS

## \$200 SAVED 100 HOURS IN MAKING THIS DIE!



Photograph Courtesy Urbana Tool & Die Co.

**T**WO dollars worth of CERROMATRIX used for locating the punches saved more than 100 hours in making the lamination die shown above.

The Urbana Tool & Die Company, Urbana, Ohio, one of the largest custom tool and die plants in the country, have been using the CERROMATRIX method of constructing dies for four years with substantial savings to their customers. Advantages of this type of construction are: die life is increased due to more accurate alignment of punches; savings of 10 to 100 hours or more with only a small amount of alloy; dies made in less time, thus insuring earlier shipment.

CERROMATRIX expands slightly on solidification, creating a tremendous pressure around each part, and holding it firmly in position. New applications for this unusual alloy are being discovered from time to time.

Other useful low-temperature-melting alloys are: CERROBEND for filling tubes and metal mouldings while bending, and CERROBASE, a non-shrinking metal for proof casting and duplicating master patterns.

*Literature sent upon request.*

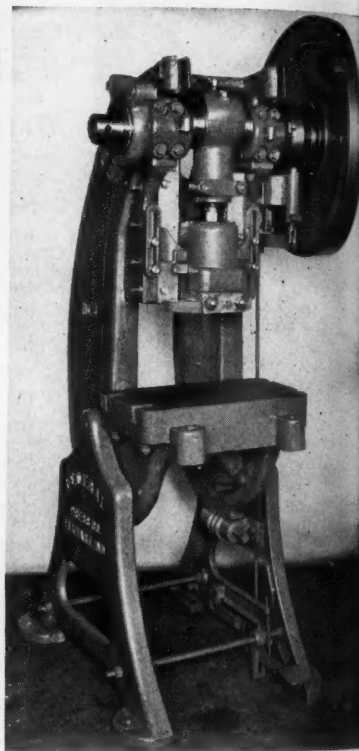
## CERRO DE PASCO COPPER CORPORATION

44 Wall Street, New York, N. Y.

British Associates: Mining & Chemical  
Products, Ltd., London, England

all sizes of Federal presses. To be known as the Multi-Pin Clutch, the improvements are said to effect greater speed, more power, longer life, greater economy and greater dependability.

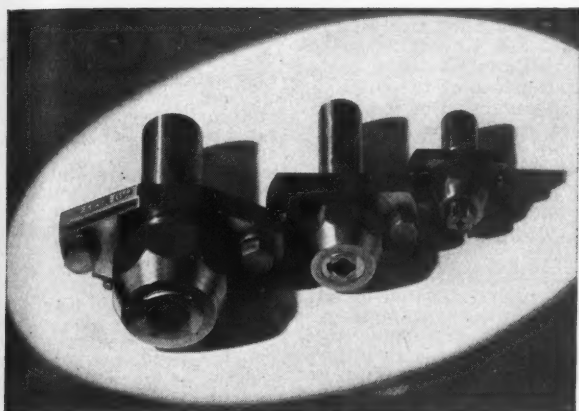
The increase in speed is obtained by the use of multiple pins mounted



Federal Multi-Pin Clutch

the crankshaft so as to engage with a corresponding number of openings in a hardened alloy steel plate which is attached to the flywheel. By locating the pins in a series around the crankshaft with a minimum of space between the pins, instantaneous action upon tripping the press is obtained. The use of multiple pins is said to afford capacity of approximately three times that of a single-pin clutch. Since the clutch pins are mounted in a solid forging, the power from the flywheel is transmitted directly to the crankshaft.

The pins are moved in and out of en-



## *For large drills--For small drills*

**A** LCO Drill Chucks are procurable for a wide range of drill sizes. Whether your screw machines are operating on heavy work or light work, you'll find that these chucks will save you money . . . produce better work faster . . . without the bother and expense of bushings. Absolute concentricity is assured. Drill breakages are reduced. Adjustment is simple and positive. A single wrench does the trick. And ALCO Tap holders, almost identical in construction, operation and adjustment, are just as essential for economical operation of your screw machines. These tools will frequently take your operating cost figures out of the red and put them into the black. Investigate NOW, when you most need to effect economies. Alco Tool Company, Bridgeport, Conn., U. S. A.

**ALCO** EFFICIENT **TOOLS**

agement by a cam of alloy steel, hardened and ground. This cam is actuated by contact with a shaft extending horizontally toward the rear of the press, a roller on the contacting end of the shaft serving to reduce wear to the minimum. The opposite end of the shaft is attached to the tripping rod; thus when the press is tripped, the shaft moves horizontally toward the rear and releases the cam, forcing the pins into the wheel.

All parts of the clutch are easily and economically replaced. The round clutch pins can be removed without removing the flywheel. The flywheel facing can easily be replaced and can be furnished to allow backlash for testing dies or close fitting for continuous roll feed jobs or to avoid recoil where pressure pads are used. Incorporated in the clutch is a simple, positive built-in single stroke tripping mechanism which is easily engaged or disengaged for single or continuous operation. Another feature is a safety device which, when engaged, will hold the clutch out of operation and thus make it impossible for the press operator or die-setter to accidentally engage the clutch with the flywheel while setting dies.

## Hayes Torch Machine

To accommodate the plant which has only occasional use for a pantograph operated cutting torch, Hayes Track Appliance Company, Richmond, Ind., has brought out the torch machine shown in the illustration. The feature of the machine is its sturdiness of construction, absence of delicate mechanism and economy in the matter of cost.

The design of the machine is based on the well-known pantograph principle, which the contour of any template the lines of any drawing can be followed exactly, the torch duplicating the movement of the tracing wheel. The L-shaped frame provides the necessary stiffness but leaves space for placing material to be cut immediately at the left of the tracing table. The pantograph assembly is carried by extensions from the frame, all parts of the pantograph being made of heavy tubing with sturdy but smooth operating joints.

Power to move the tracing wheel is provided by a motor which is attached to the shop lighting circuit. This motor is anchored to a base plate which is attached to the frame. Power is transmitted from the motor to the jack shaft by means of a V-belt and a series



# PROCUNIER HIGH SPEED TAPPING ATTACHMENTS

## Special Features:

**CLUTCH**—double-cone, cork-faced friction clutch. Sensitive, Powerful. Practically indestructible.

**BALL BEARINGS**—afford rigidity, accuracy, and long life.

**REVERSE**—speed twice forward speed through Patented Three-Point Balanced heat treated Reversing Mechanism. Less strain and wear.

**"TRU-GRIP"**—collet type tap holder. Smallest and lightest of its kind. Most accurate and practical tap holder that ever held a tap.

PROCUNIER—Style "E" high speed tapping heads will cut your tapping costs. Write for new folder.

## PROCUNIER SAFETY CHUCK CO.

12 SO. CLINTON ST.

CHICAGO, ILL.

# MCGILL BEARINGS



*Just Keep  
Rolling  
Along"*

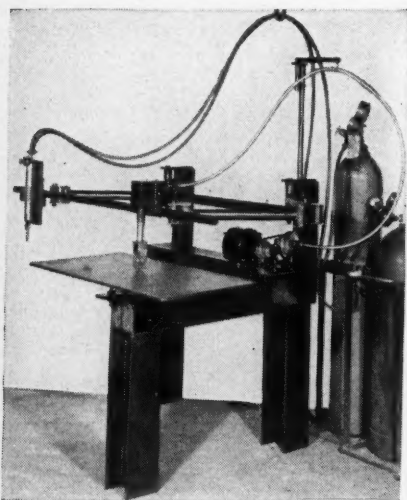
Designers, builders and users of tools and machinery all around the world appreciate the way McGill Bearings hold up. Particularly under sustained heavy or intermittent shock loads they "just keep rolling along" — demonstrating the value of quality steels and precision construction which reduce wear and replacements to the minimum.

McGILL Bearings embody many exclusive types and designs. The MULTIROL Precision Bearings, for instance, are unequalled for great load capacity in small radial space. They far outrun plain bearings with which they can often be interchanged dimensionally. Since their introduction nine years ago, they have proved their superiority in thousands of installations—including practically every type of equipment from sewing machines to railroad locomotives. Many sizes and designs are carried in stock, and special designs are developed to meet your requirements.

Send for Bulletin No. 37

**MCGILL MANUFACTURING CO.**

1500 N. Lafayette Street  
VALPARAISO, IND.



Hayes Torch Machine

V-pulleys of various sizes which make a variety of speeds available. From the jack shaft a flexible shaft hung on a

hinged arm carries the power to a speed reducer at the top of the tracing wheel assembly. The support for the torch allows the torch to be moved up and down and also slanted at an angle for beveling and similar work. The table under the tracing wheel is supported on a three-point bearing accurately adjustable to the tracing wheel. The tracing wheel and torch are arranged to operate at speeds of 5, 10, 16 and 24 in. per minute, as required for cutting material from the very thin up to 6 in. in thickness. The machine weighs 625 lbs. and requires floor space of 4 ft. 2 in. by 9 ft. 6 in. to allow for extreme movements of the pantograph.

### Universal Punch Press Guard

Designed by men with years of practical operating experience in stamping plants, the Universal Punch Press Guard shown in the illustration is now being marketed by Grand Haven Stamping Products Co., Grand Haven, Mich. The feature of the guard is its simplicity of construction and operation together with positive action. There is no obstruction between the operator and the work, yet where this guard is used it is impossible for the operator to get his

## PULLMORE CLUTCHES

### Work Well and Save Space In Sundstrand Vertical Lathe

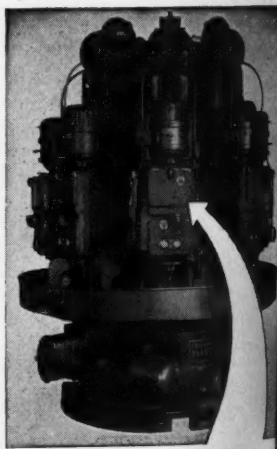
A No. 3, single type, Pullmore Clutch, running in oil, in each of the 8 Hydraulic Units of the Sundstrand Vertical Lathe shown at right, is automatically engaged for spindle rotation during rapid approach and feed of its Unit, is disengaged so that spindle remains stationary during quick return. This service demands a full measure of reliability and durability in the clutch—and these demands are satisfied by the Pullmore. The design of the Hydraulic Units calls for a clutch that is compact and easily installed—requirements that are satisfied completely by the Pullmore.

Complete information about Pullmore Clutches, illustrations of many of their applications, and other useful information will be found in the Pullmore Blue Book. Write for free copy, today.

### ROCKFORD DRILLING MACHINE DIVISION

Borg-Warner Corporation, 300 Catherine Street, Rockford, Illinois

Sold by MORSE CHAIN CO., Ithaca, N. Y. Offices in principal cities



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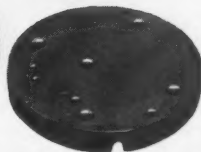
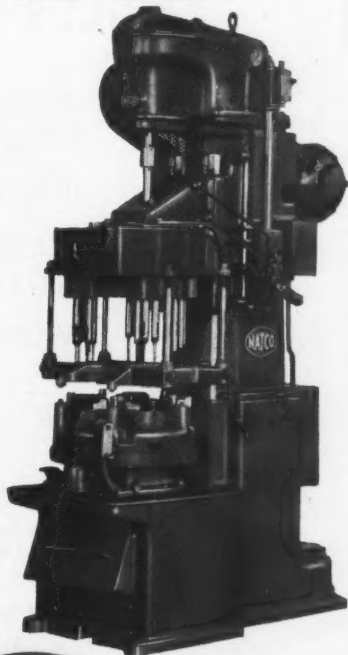


# MATCO B-225H DRILLER

**FOR RAPID DRILLING  
EASE OF OPERATION  
DEPENDABILITY**

## **...the NATCO B225H Machine Drills and Counts Nine Holes in 150 Valve Plates Per Hour.**

This NATCO B225H drill head driller is being used by a prominent manufacturer. It is built with an 18-spindle drill head and a five-position fixture mounted on a hand indexed rotating table. This machine is of simple sturdy design . . . is easy to operate and will stand hard usage over long periods with little maintenance expense. Write today for complete literature.



**THE NATIONAL AUTOMATIC TOOL CO.**  
**Richmond, Indiana, U. S. A.**

Investigate  
NATCO Methods for  
Lower 'Hole'  
Costs!

# NATCO

## Drilling, Boring and Tapping Machines

# PROVIDENCE PRECISION DRILLS



**MORE  
HOLES  
per  
HOUR**  
**LESS  
COST  
per  
HOLE**

**Four Models**  
**One to Six Spindles**  
**Belt or Motor**  
**Drive**

**All Ball Bearing**

**Hand or**  
**Power Feed**

On a basis of production capacity—which is the only true measure of a machine tool's value—PROVIDENCE PRECISION DRILLS are distinguished by their outstanding performance, even after years of service. Their PRECISION is an in-built quality which long-continued operation does not impair. They are true PRECISION tools meeting the most exacting requirements. Yet they cost no more.

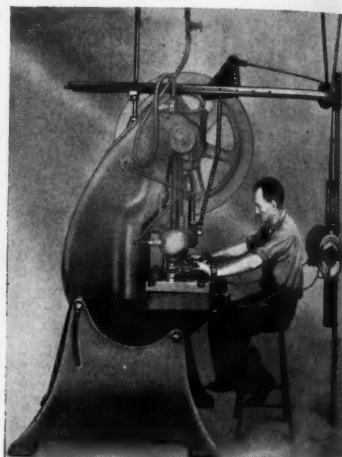
*Write for the Bulletin*

**PROVIDENCE ENGINEERING  
WORKS, INC.**

523 So. Main St., Providence, R. I.

hands into the machine when it is operating.

The guard consists essentially of a vertical post and horizontal beam supporting pulleys over which a cable passes from the ram of the machine to wristlets which are fastened to the operator's wrists. As the press ram descends



Universal Punch Press Guard

operation, the cable travels with it, pulling the operator's hands back out of the safety zone. Thus when the wristlets are properly attached, the operator can proceed with his work knowing that it will be impossible for his hands to be in the danger zone of the machine when it is in operation.

The use of this device does not in any way interfere with the operation of the press nor the convenience of handling work. The working parts of the guard are fully protected, preventing failure of operation from any outside force. The cables which attach to the wristlets are cotton braid with wire rope centers and are clearly visible so that wear can be detected. All movable parts of the mechanism are equipped with ball bearings. The steel standard to which the operating mechanism is attached is adjustable for height to suit any press. The standard is hinged at its junction with the horizontal beam so that it can be disconnected from the floor and raised when necessary, making the space in front of the press available for installation of dies with trucks and allowing the press to be used for blanking operations without the necessity of disc-

"9000-D  
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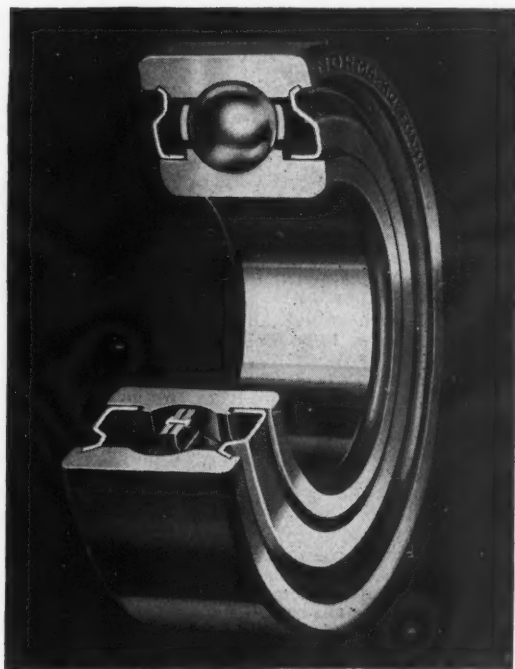
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NORMA

ave, 1938

"9000-DD", with Double Metal Seals, here shown; also made as "9000-D" with Single Metal Shield.

## LARGER GREASE CAPACITY • NO SEAL DRAG



IN "9000" SERIES (Feltless)

## SELF-SEALED BEARINGS

Interchangeable in dimensions with felt seal bearings.

Employs simplified, inwardly extending, flanged metal shields which do not rotate and cannot "soul" other rotating seal parts.

Seals are highly efficient in retaining grease in either horizontal or vertical position.

Simple seal occupies less space within bearing than felt seal, PROVIDING GREATER GREASE

CAPACITY AND A MORE LASTING LUBRICANT SUPPLY.

Metal seals, though close fitting, clear recess on inner ring, ELIMINATING "DRAG" OR FRICTIONAL RESISTANCE and power loss, and providing higher starting speeds and increased efficiency. Seals cannot wear and are permanently effective.

Totally sealed against foreign matter, providing absolute cleanliness at all times.

# **"NORMA-HOFFMANN"**

## PRECISION BEARINGS

BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U. S. A.

necting the guard from the press. The guard is easily installed by an average mechanic.

### Standard Universal Surface Gage

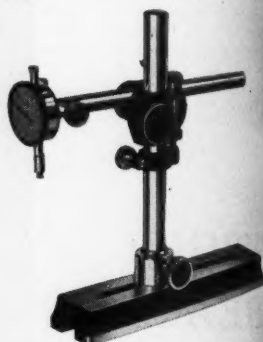
A universal surface gage in the design of which several noteworthy features have been incorporated has been brought out by Standard Gage Company, Inc., Poughkeepsie, N. Y. The manufacturer states that care has been given to every detail in design and construction to meet requirements long sought by inspectors, toolmakers and machinists.

A vertical vernier on the indicator support arm makes it possible to set up the instrument in the minimum time. A friction spring concealed in the swivel prevents the indicator arm from dropping when the clamp is loosened for adjustment. A unique cam lock holds the column to the base. A turn of the thumb screw releases or locks the column and permits quick adjustment at any position on the base.

The base is serrated to minimize friction and to insure clean contact against surface plates. By attaching a "Standard" lapped and serrated table to the base, the instrument is converted into a com-

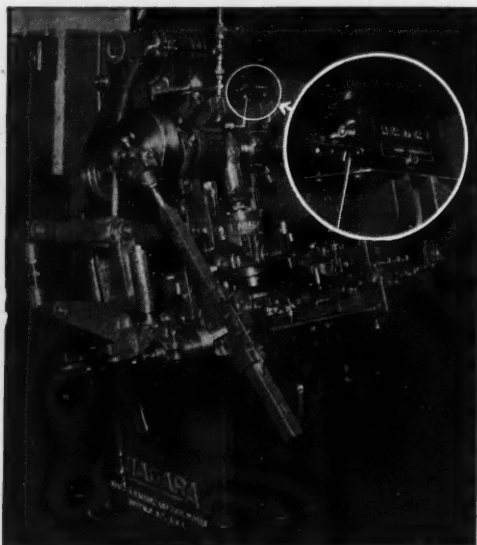
parator for measuring diameters, lengths and so on.

The dial indicator can be supplied graduated in 0.0005 in. with spindle



Standard Universal Surface Gage

movement of 0.300 in. or in 1/100 in. with spindle movement of 8 mm. The instrument can be equipped with "Standard" Model 1-X Dial Indicator which is graduated in 0.001 in. The instrument is attractively finished



4R-1 Predetermined Productimeter on a Niagara Press fitted with automatic Littell attachments.

### A fast horse needs a good jockey

The new high speed punch presses need dependable controls just as spirited horses need good jockeys to keep them at it and pull them up when the race is run. Before you start your press set the quantity of stampings needed on its Predetermined Productimeter. When the order is filled the press will stop. No waste from over-runs, no re-setups for under-runs, no time wasted in hand counting.

Save waste with Productimeters on all production machines.

### DURANT MFG. CO.

1932 N. Buffum St., Milwaukee, Wis.  
173 Eddy Street, Providence, R. I.

Sales Offices in All Principal Cities

# The POWER LINE to Better Profits

The famous Millers Falls line of electric tools constantly advances in quality and continues to add to its fine selection.

Like the wonderful Dyno-Mite Drill, for instance. Users of this sensational streamlined tool of power will welcome the news that the same power plant is now available as a screw driver and nut runner. Its new "Automatic" Clutch permits extremely fine adjustments from outside the tool. Ingenious principle transmits vibration-free, velvet-smooth power. Ask us to demonstrate it on your own work.

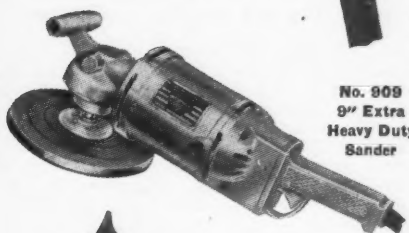
If you haven't already received your copy of our big new Catalog 42, write today. It contains many other new Millers Falls items you should know about.



**Millers Falls Company**  
Greenfield, Mass.



No. 33  
Dyno-Mite  
Screw Driver



No. 909  
9" Extra  
Heavy Duty  
Sander



No. 312B  
1/2" Heavy  
Duty Ball  
Bearing  
Drill

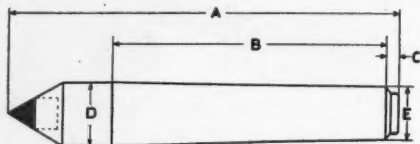


No. 807  
7" Heavy  
Duty Ball  
Bearing  
Grinder

chromium plate and black crystallized lacquer.

### Red-E Cemented Carbide Tipped Center

The illustration shows the design of a cemented carbide tipped center for use in lathes or grinders which has been



Red-E Cemented Carbide Tipped Center

brought out by The Ready Tool Co., Bridgeport, Conn. The center has an alloy steel body and a point made of special high grade cemented carbide having a Rockwell hardness of 90A and a tensile strength of 210,000 to 240,000 lbs. to the square inch. The body is available in various standards as required both for lathes and cylindrical grinders.

The center is available with tapers from No. 1 to No. 5 Morse, from 7 to 11 Brown & Sharpe, and from 6 to 12 Jarno. The diameter of the insert ranges from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. Morse, from  $\frac{5}{16}$  to  $\frac{3}{8}$  in. Brown & Sharpe, and from  $\frac{5}{16}$  to  $\frac{9}{16}$  in. Jarno.

### Warner & Swasey Announces Complete Line of Turret Lathe Tools

A complete line of tools for turret lathes has been announced by The Warner & Swasey Co., Cleveland, Ohio. The line includes dozens of new tools, holding devices and miscellaneous equipment designed for new conceptions of speed and power and is said to be the result of research extending over a period of two years during which the entire line of turret lathe tools and accessories was critically reviewed and studied.

One of the features of the new tool program is the improvement aimed to reduce set-up time. The design is such that, through the use of adjustable cutters, simplified clamping devices, and so on, they can be changed and set up easily and quickly. The tools are designed and built to handle a wide range and variety of work.

One of the new tools is an adjustable single turning head with one hole adjustable in the vertical position. With

this tool, the turning cutter holder held in an adjustable block is quickly set to size and can be changed from one job to another by simply moving the block up and down. This adjustable turning head is said to provide a flexibility in tooling that revolutionizes heavy duty turret lathe practice.

Other important new improvements are in the arrangement of heavy duty multiple turning heads and overhead pilot bars. The new multiple turning head is equipped with a pilot bar bracketing which makes possible the use of stationary type bar clamped to the head of the machine instead of an overhead pilot bar fixed to the multiple turning head. With this tool only one overhead pilot bar is needed to serve any number of heads on one turret.

A quick-acting slide tool which combines in one attachment the best features of the standard slide tool and the standard boring and recessing tool is another completely new device in the new line. It is designed for fast recessing the slide moving  $\frac{1}{2}$  in. with a one quarter turn of the handle. Another new tool is a multiple cutter turner designed for combining in one operation two, three or four heavy turning cuts on bar work. Multiple cuts with heavy feeds can be taken with this tool. Roll brackets are anchored to the cutter block and braced against the back of the tool with the result that the rolls will not spring away from the work and thus cutters can be added without changing the cutting diameter of those already set.

An adjustable angle cutter holder with wedge-type slide lock, a taper turner with roller back rest for turning large motive frame bolts, an adjustable knee tool for short bar work, stub boring bars, sleeves for eliminating excessive overhang on small diameter stub boring bars, and stub boring bar cutter heads for combining chamfering and boring cuts in one operation are other new tools designed to increase the productivity and efficiency of the turret lathe.

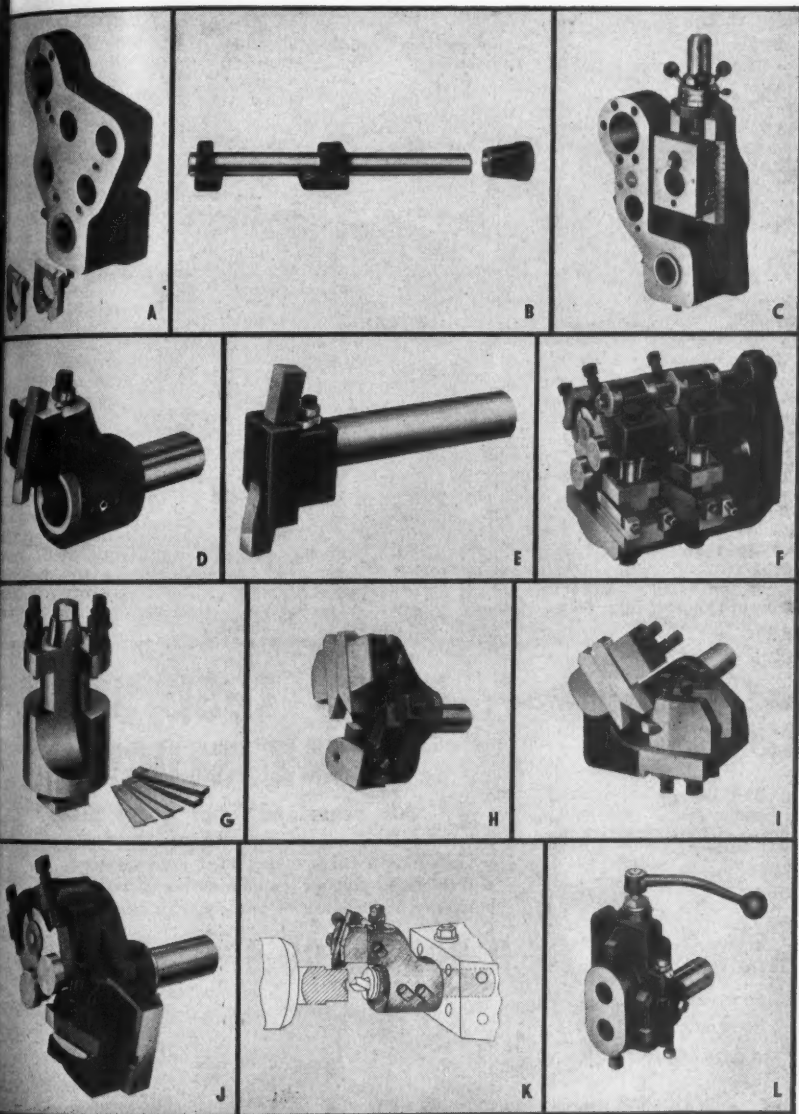
A line of chucks in the heavy duty class will be presented for the first time with these tools. To provide for increased speeds and heavier cuts, the new chucks are massive and rigid. All chucks in the new line are adaptable to flanged spindles, and all are pressure grease lubricated. In the T-slot type, master jaws are recessed below the face of the chuck to allow for the mounting of fixtures without the removal of the master jaws.

All of these tools are presented in a 180-page tool catalog and manual which can be had upon request by any machine shop executive.

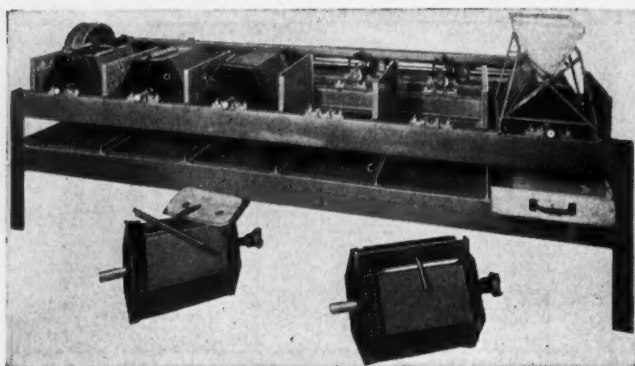
Warner & Swasey Co.  
Adjustable Anvil  
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Warner & Swasey Heavy Duty Multiple Turning Head. B—Stationary Overhead Pilot Bar.  
Adjustable Single Turning Head. D—Adjustable Knee Tool. E—Heavy Duty Type Ad-  
justable Angle Cutter Holder. F—Multiple Cutter Turner. G—Two-Cutter Facing Block.  
Single Cutter Box Turner for High Speed Turning. I—Multiple Cutter Box Turner.  
Combination End Face and Turner. K—Application Drawing of Adjustable Knee Tool.  
L—Quick Acting Slide Tool.



Munning "Improved Type" Multiple Unit Tumbling Machine

### Munning "Improved Type" Tumbling Machine

The tumbling machine illustrated herewith is now being marketed by Munning & Munning, Inc., 202 Emmett St., Newark, New Jersey. The machine is available in single and multiple units with tubs of standard size for either belted or direct connected motor drive. Drums are of high grade cypress, maple

or oak panels, desired, snugly fitted into cast aluminum heads with a friction roller which can be quickly fitted or detached.

The frame of the machine is of welded construction and tubs revolved through miter gears and spiral jaw drums which can easily engaged or disengaged at will. Each drum in the "Improved Type" multiple units may be operated independently and if occasion

to remove a drum from the mechanism it can be lifted out of its bearings without dismantling any parts or disturbing the balance of the apparatus in motion.

Loading of the Munning "Improved Type" tumbling machine is accomplished through a hopper arrangement placed over the drums while in the stationary position. To unload, the barrel is simply inverted for discharge while the machine



KINITE is also available cast-to-shape from your own pattern.

Write for new, complete booklet.



### KINITE Files Easily

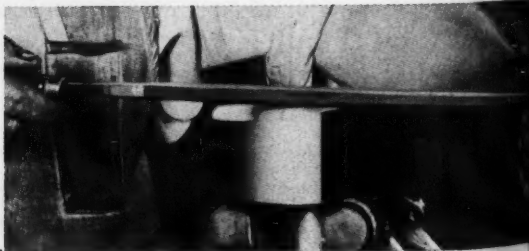
Drills Easily  
Taps Easily  
Machines Easily

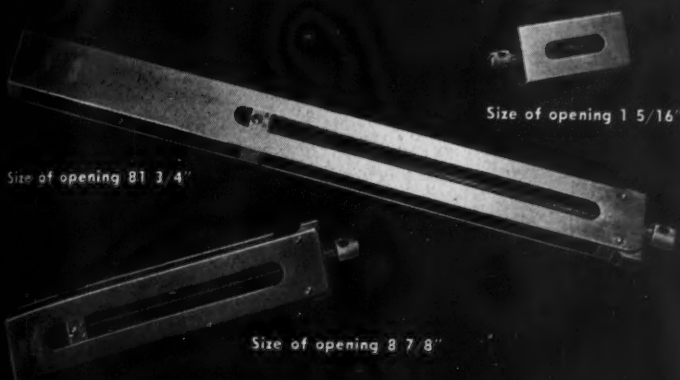
## ALLOY TOOL STEEL BAR STOCK

### All Standard Tool Steel Sizes

- Furnished in an annealed condition.
- Lasts 3 to 6 times longer than ordinary steels.
- Hardens in still air — eliminating distortion.
- Takes a high polish — reducing friction in moving parts.

**H. BOKER & CO., INC.** 103 DUANE ST. NEW YORK 1





## ADJUSTABLE HOLDERS FOR JOHANSSON BLOCKS

protect and make handling easier

Johansson Adjustable Holders keep blocks in line, keep them clean, make them easier to handle, and protect their faces if they are dropped or laid down roughly.

They come in 3 types ranging in price from as little as \$4. There are 14 sizes, with openings from



1 1/16 to 8 1/4 inches. Every one owning Johansson Gage Blocks should add the convenience and protection of holders and see that his employees use them. Complete

information about Adjustable Holders and other Accessories is in Catalog No. 12. Write to Dept. G.

**C. E. JOHANSSON DIVISION**

DEARBORN, MICHIGAN

FORD MOTOR COMPANY

empties into a double tray of the drawer type as shown in the illustration. The inner tray of this combination retains the finished work, while the outer tray, which has a finer screen, retains the burnishing balls. The inner tray, being slightly shorter in length than the outer one, may be shaken back and forth for complete separation of the work from the balls before complete removal from the machine. In wet tumbling, the liquid used during the operation can pass through a screened drain in the bottom of the machine.

The simplicity and versatility of the machine, due to the accessibility of all its parts, renders it highly effective for wet or dry tumbling articles of the following types: chains, tubes, cups, pins, studs, pens, optical goods, jewelry, safety razors, novelties, curtain rods, dental tools, surgical instruments, watch crowns, household fixtures, ring settings, eyeglass frames, purse frames, and so on.

### Harnischfeger Self-Supporting Pillar Jib-Crane

The Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wis., has recently developed a self-supporting pillar

jib-crane for work in side bays, headroom areas, and other confined spaces where overhead traveling crane hoist service is not available or practical.



Harnischfeger Self-Supporting Pillar Jib-Crane

A strongly-built, well-balanced unit with jib-arm swinging on roller bearings, this jib-crane is built in capacities to 5 tons, heights up to 20 ft. and a maximum radius of 20 feet.

The unit is practical for use throughout industry—in machine shops, etc.



Specify

**"HALLOWELL" TOTE PANS**

because:

- 1—Will stack high. 2—Stack firmly—can't topple. 3—Handles can't loosen. 4—Welded, can't get rickety. 5—Fire-proof.

Fig. 1532  
Pat. Appld. for

## "HALLOWELL" TOTE PANS stand roughest treatment

They're made of heavy steel and welded together so they'll take far more punishment and can be packed with heavier loads without going to pieces.

Handles are positively locked in place and can't pull out while the corners of these boxes are reinforced through their distinctive design and manufacture.

"Hallowell" Tote Pans won't get old soaked either as will wooden boxes. All told, you save real money when you invest in "Hallowells."

**STANDARD PRESSED STEEL CO.**

BRANCHES

BOSTON

DETROIT

INDIANAPOLIS

JENKINTOWN, PENNA.

BOX  
556

BRANCHES

CHICAGO

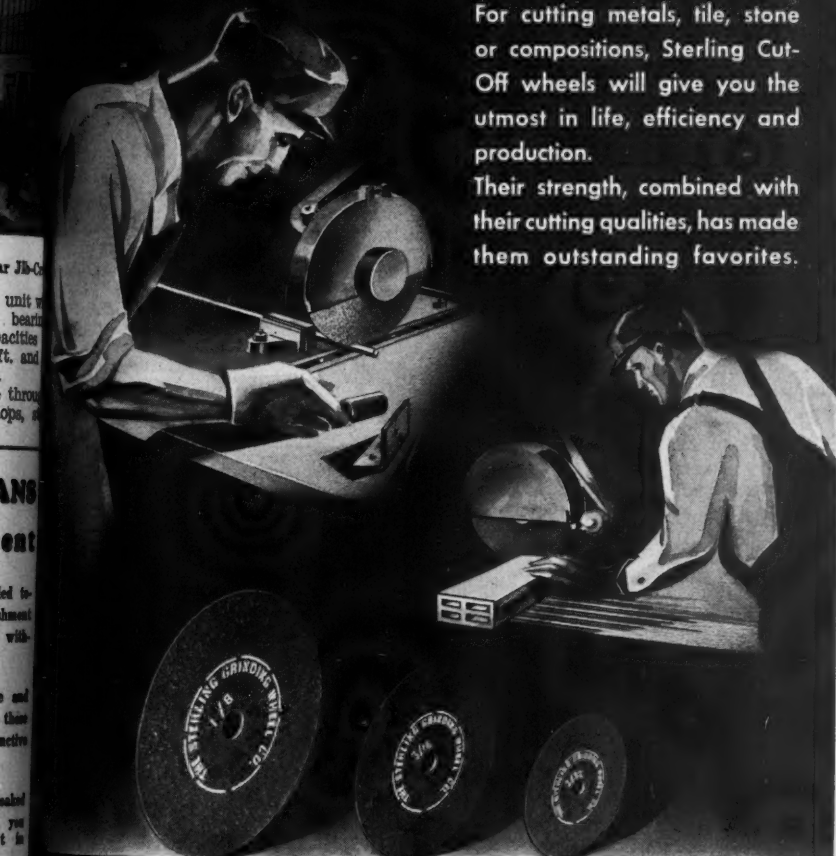
ST. LOUIS

SAN FRANCISCO

# DO YOU USE *Sterling* CUT OFF WHEELS?

For cutting metals, tile, stone or compositions, Sterling Cut-Off wheels will give you the utmost in life, efficiency and production.

Their strength, combined with their cutting qualities, has made them outstanding favorites.



**THE STERLING GRINDING WHEEL CO.**

Abrasive Division of The Cleveland Quarries Co.

Factory and Office: TIFFIN, OHIO • CHICAGO: 912 W. Washington Blvd. • DETROIT: 101-107 W. Warren Ave.

**STERLING GRINDING WHEEL CO. ABRASIVES**

mills, wire mills, canneries—and all types of production plants where materials are lifted, lowered or moved in the process of manufacture. Among its typical uses is the work which is being handled by a recent installation of the 5-ton type for transferring plates from a modern welding shop to industrial trucks in a side bay too low for crane service. Another 2-ton type is typically used in a steel mill for service in moving the ladle from the side bay in an electric furnace operation.

This type of crane may be furnished with either the standard P&H pendant rope or push-button controls on the hoist, or may be equipped with the P&H Push-Button Master Variable Speed Controller which controls all lifting, lowering and traveling operations. According to the manufacturer, the boom swings with ease and is a great aid in speeding up production. Installation can be made without the need of revamping existing supports.

### Ideal Electric Metal Etcher

An electric etcher for making permanent markings on metal surfaces has been announced as an addition to the Ideal line of electric tools manufactured

by the Ideal Commutator Dressing Company, 4004 Park Ave., Sycamore, Ill.

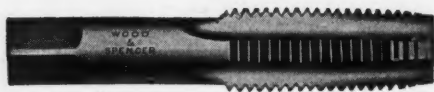
Used in the same manner as an ordinary lead pencil, the etcher writes, prints or marks on tools, gages, dies and metal parts. The permanent lettering



Ideal Electric Metal Etcher

stands out clearly and positively, eliminating mistakes and losses, confusion and improper assembly. The etcher operates rapidly, economically and accurately. Two points are provided with the unit—one copper that may be sharpened for fine marking, and the other special alloy for ordinary marking. The depth of the mark is controlled by the speed at which the point is moved over the metal, and also by changing the Hi-Lo switch on the transformer.

## WOOD & SPENCER TAPS



**PROMPT DELIVERY and SERVICE**

**STANDARD-SPECIAL-CUT or GROUND THREAD**

**CARBON or HIGH SPEED STEEL**

**THE WOOD & SPENCER CO.** 1910 E. 61st St.  
CLEVELAND, O.



June, 19

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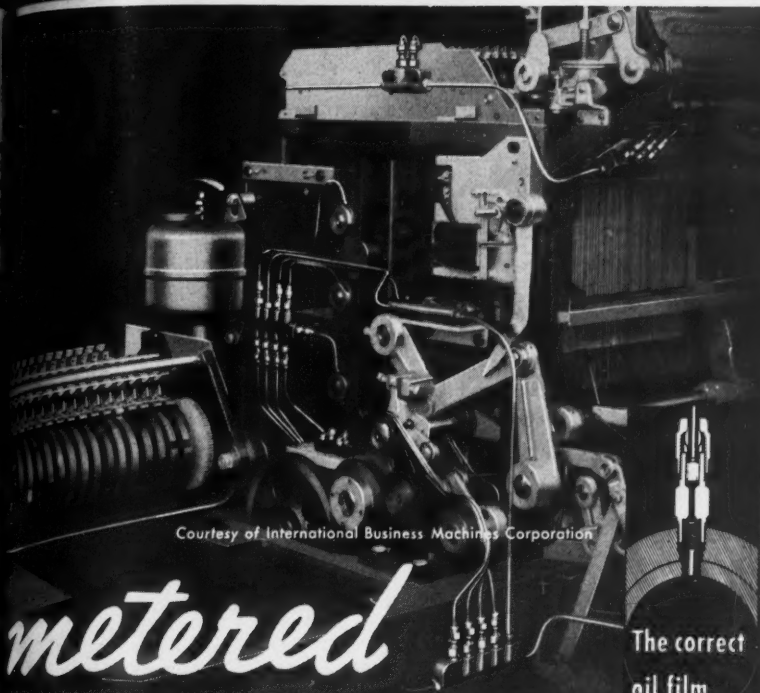
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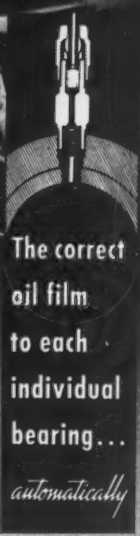
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Courtesy of International Business Machines Corporation

# metered oil film...



The correct  
oil film  
to each  
individual  
bearing...

*automatically*

● Machines remain efficient . . . stand up . . . only when properly lubricated. With the Bijur Automatic Lubricating System, each bearing is served by its own meter-unit. The lubricator pump measures a predetermined quantity of oil feed to the distribution system; the meter-units apportion the feed to the individual need of each bearing—whatever its size, speed, load. Unfailingly . . . automatically. No lubrication problems, worries, profit-eating expense!

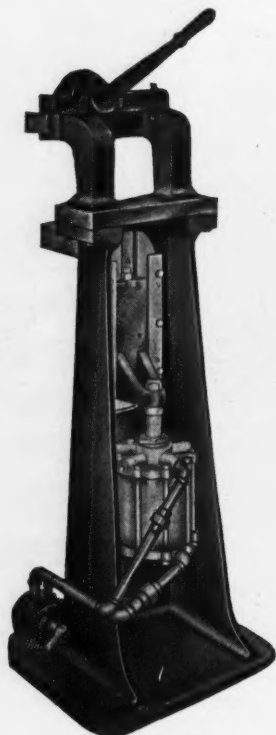
BIJUR LUBRICATING CORPORATION • LONG ISLAND CITY, NEW YORK

# BIJUR

AUTOMATICALLY *Correct* LUBRICATION

# MARKING

## FLAT—ROUND IRREGULAR SURFACES BY ROLLING OPERATION



MODEL 25

### HI-DUTY MARKING MACHINE

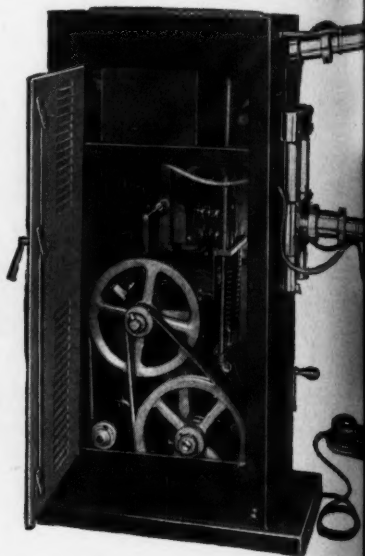
This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

**GEO. T. SCHMIDT, Inc.**  
1806 BELLE PLAINE AVE.  
CHICAGO, ILL.

The complete unit consists of a handle with two points, a 4x7-in. work plate, and a 5-ft. No. 6 flexible wire with a carbon rod resistor and connecting halves for attaching to a No. 4AT Delta transformer.

### "Ace" Motor Driven Automatic Spot Welders

A series of automatic spot welders announced by the Pler Equipment Co., 808 Cross St., Benton Harbor, Mich.



"Ace" Motor Driven Automatic Spot Welder

is said to afford both increased output and decreased effort in the control of their operation. The welders provide control over the welding variables essential to efficient, uniform production. An outstanding feature of the machine is the Reeves Vari-Speed Transmission having a 3 to 1 ratio of speed variation. Mechanical weld timing control where welding time can be set to as fast as 1 cycle or 1/40th of a second, and precision of pressure application and accuracy of timing. Once set for a certain job, welding time and pressure are the same on each weld, providing the desirable consistency and dependability of welds essential in quantity production. A unique feature of the welders is the power drive which is a self-contained

The "Unbraked" Screw  
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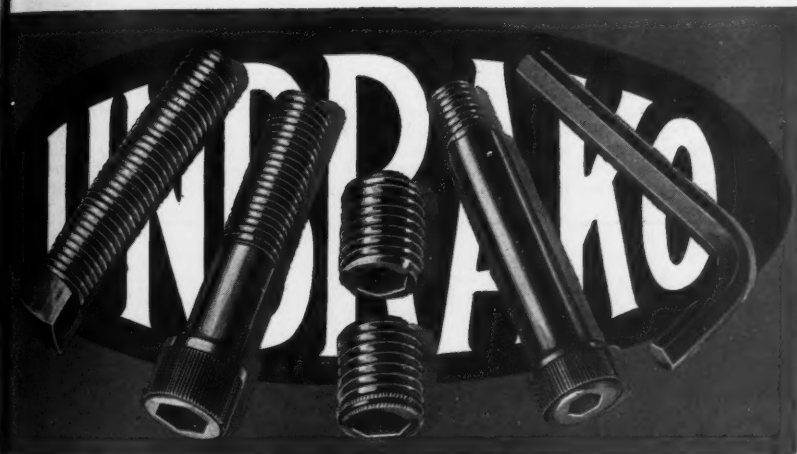
YOU GET IT WHEN YOU SPECIFY



## SOCKET SCREWS

Uniformity in metals and in accuracy of machining are most important characteristics in the socket screws used on production work. Many of the large users have found that to get this desired uniformity, plus finest alloy metals, the choice should be "Unbrako".

Send for the catalog that tells the advantages of using Knurled "Unbrako" Socket Head Cap Screws, "Unbrako" Hollow Set Screws and the newer "Unbrako" Self-Locking Hollow Set Screw.



The "Unbrako" Products shown above (from left to right) are: . . . "Unbrako" Square Head Set Screw (Fig. 1507) made of extraordinary strong alloy steel. Can be supplied with any style point.

Knurled "Unbrako" Socket Head Cap Screw (Fig. 1434) has the knurled grip head that speeds production and permits easy locking after being countersunk.

(Upper) "Unbrako" Hollow Set Screw (Fig. 232) Strong; points won't mushroom; hex won't round. Made of finest alloy metals.

(Lower) "Unbrako" Self-Locking Hollow Set Screw (Fig. 1564) Once it's tightened it will never loosen unless a wrench is applied.

Knurled "Unbrako" Socket Head Stripper Bolts (Fig. 1446) has same knurled head that turns easier. Socket head permits more compact designs.

"Unbrako" Wrench — matches the high quality of the screws with which it's used.

# STANDARD PRESSED STEEL CO.

BRANCHES

JENKINTOWN, PENNA.

BRANCHES

BOSTON

CHICAGO

DETROIT

ST. LOUIS

INDIANAPOLIS

BOX 556

SAN FRANCISCO

unit consisting essentially of the motor, Reeves Vari-Speed Drive, double reduction V-belt drive, pin-type clutch and magnetic clutch trip. The clutch is actuated through a magnetic unit controlled by a foot switch. The switch is attached to a flexible rubber-covered cable which can be placed in any convenient position, thus leaving the operator's hands free to handle the work.

The speed of operation is adjusted through a convenient crank extending through the lower front part of the welder, which adjusts the transmission. The standard units are made for speeds from 40 to 120 strokes per minute. Higher speeds are available on special order. The connecting rod has provisions for adjusting the length of stroke to 1, 1½ and 2 inches.

The welders are made in four sizes of 15, 20, 30 and 50 K.W. A particularly desirable feature of the machines is their versatility in the wide range of gauges and materials that can be welded. According to the manufacturer, materials as light as 0.005 can be satisfactorily welded with the same size welder that will also handle up to two thicknesses of 8-gauge stock. The welding capacity of the series is based on welding materials at their maximum speed of 120 strokes per minute.

### "Linconditioner" Air Cleaner

A machine which conditions air by filtering out dirt particles and which is said to remove approximately 99 percent of the dirt from the air in the vicinity of grinding, welding and other shop operations is announced by the Lincoln Electric Company, Cleveland, Ohio. The machine also draws smoke and heat away from the work thus contributing materially to the efficiency of welders and to the general improvement of shop conditions. It can also be adapted for blowing smoke away where such operation is desired.

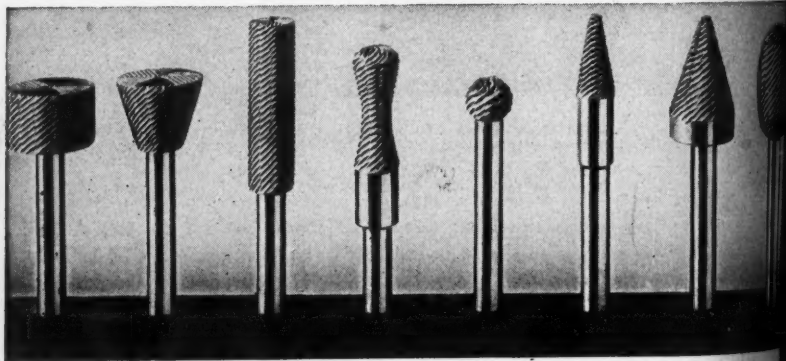
The new air conditioning machine known as the "Linconditioner", has been developed to provide work shops with an economical solution to the problem of cleaning shop air. It removes the smoke and dirt at their source rather than after they have combined with large quantities of air. Also, since no air is taken in or blown to the outside of the building, the machine is said by the manufacturer to conserve plant heat.

The "Linconditioner" consists of a motor driven fan which produces suction through a flexible metal tube. The fan draws the air through the flexible tube and exhausts it in a filter which is

## FORD HAND CUT



## ROTARY FILE



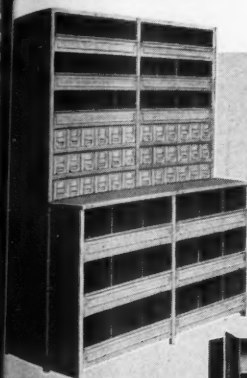
Just a few of the many standard shapes which are carried in stock.  
Write for full information.

408 PERSHING AVE.

**M. A. FORD MFG. CO.**

DAVENPORT, IOWA

# STEP UP *Plant Efficiency!*



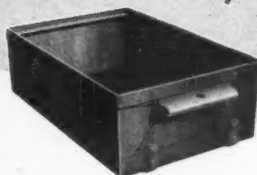
Storage Shelving



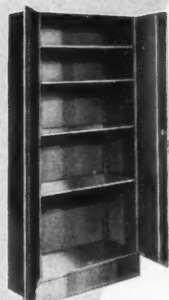
Shop Benches



Folding Chairs



Tote Boxes



Storage Cabinets



Lockers

Lyon Shop and Storage Equipment has definitely demonstrated its ability to promote plant efficiency and economy in many industries. Its use makes possible substantial savings in materials handling . . . in labor . . . through the release of floor space for actual production work . . . and by reducing the losses of unbalanced stock inventory. Mail coupon for complete details. Lyon Metal Products, Incorporated, Aurora, Illinois.

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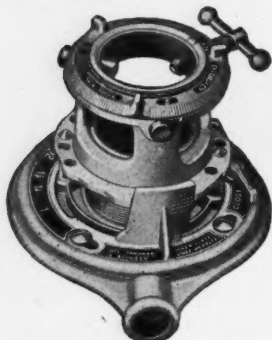
- ☐ Storage Shelving; ☐ Work Benches;  
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# STOP *the bother of changing* Chaser Dies

**RIDGE**  
No. 65R

**Threads 1" to 2" Pipe with  
ONE Set of Chasers**



Instead of 16 chaser dies to lug around, to risk losing, to waste valuable time changing, this threader has only 4—and

they stay in the threader.

A quick shift of the setting post and you're ready to cut perfect threads on 1" to 2" pipe, any metal—a convenience that runs into real money saving. Like many thousands of users, you go for the new style workholder that clicks to pipe size with a twist of the gauge ring and tightens with one screw. No bushings to bother with. Plenty of other efficiency features in this rugged modern threader. You get real satisfaction out of owning and using this **RIDGE** 65R. Try one at your Jobber's—buy it for better, faster, easier threading.

The Ridge Tool Company, Elyria, Ohio

**RIDGE**

cated in the periphery of the power unit. The flexible tube is supported by a welded steel arm and spring arrangement, as shown in the illustrations, so that the nozzle can be shifted to any desired position within the operating radius of the tubing.

The fan is powered by a one-half hp. 2 or 3 phase, 60 cycle motor. Motors can



"Linconditioner", new air conditioning machine developed by The Lincoln Electric Company, Cleveland, Ohio, being used in conjunction with welding of copper to carry away and dirt particles away from the operator.

be furnished for 110, 220, 440 volt. Motors ordered for 220 or 440 volts, 60 cycle, can be reconnected from one voltage to another, and can be used on a 3 phase supply of the same voltage.

A welded steel supporting arm holds the flexible tube in any desired position without the use of rods, hooks, and bungs, brackets, and so on. The tube can be swung around rapidly, turning on a swivel joint bushing at the top of the power unit. A supporting swing gives additional stiffness to the tubing and can be clamped at any point on the tube to suit the application.

The standard flexible tubing is 10 ft. long and permits operation within a circle of 14 ft. in diameter. Special lengths of tubing up to 40 ft. are available.

A short pipe extends from the side of the power unit which leads directly to the chamber above the fan. When the

4

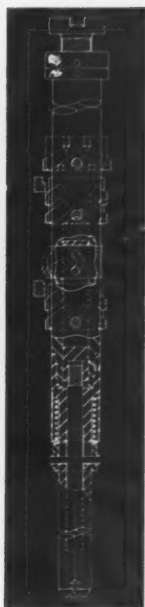
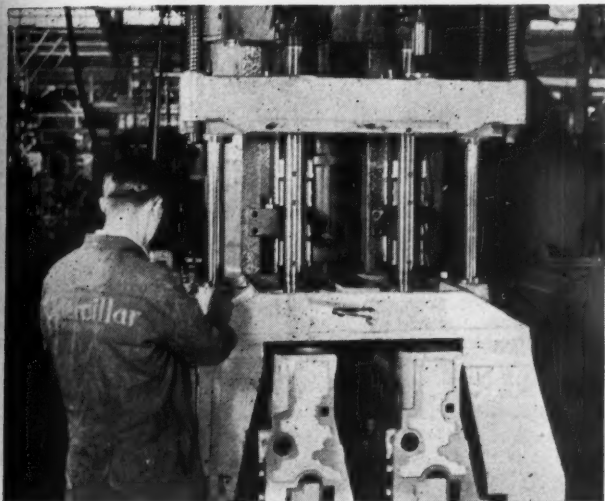
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# 4 Distinct Types of Operations in this 1 DAVIS, Block Type Boring Tool!



The diversified application of Davis Block Type Boring Tools is admirably illustrated in this interesting set-up. Here, these specially-designed tools are boring "Caterpillar" Diesel Engines complete for cylinder sleeves — rough bore, finish bore, counterbore, and inside chamfer — all in one operation! Outstanding among the block type cutters in this tooling, is a unit for inside chamfering. This cutter is automatically expanded and contracted by means of an inner plunger bar, and is of the disappearing type. Multiple cutter blocks are also featured, to rough and finish bore. Tungsten Carbide tipped cutters are used.

If you have an *unusual* boring job — a particularly *hard* boring job — a *too-high-in-cost* boring job — it will pay you to find out just what Davis Block Type Tools could do for you. Send us prints of your work and, without obligation, we will submit you a helpful, specific recommendation.

*New Block Type Tool Booklet Free on Request*

DAVIS BORING TOOL DIVISION

LARKIN PACKER COMPANY, INC., ST. LOUIS, U. S. A.

# DAVIS BORING TOOLS

"Linconditioner" is used for suction, this pipe is closed by a rubber cap. By disconnecting the flexible tubing from the swivel joint and inserting the tubing in this blower outlet, the fan draws air through the suction opening and exhausts it through the tubing. This connection is applicable to welding operations in tanks, pipes or large bases in order to blow away the smoke and heat and provide greater comfort for the welding operator.

### Porter-Cable Type T-33 Take-About Sander

To provide a light weight, yet sturdy and powerful belt abrasive machine for sanding and light grinding operations on wood, marble, metal, or composition materials, the Porter-Cable Machine Company, Syracuse, N. Y., has announced the Take-About Sander, designated as Type T-33.

Endless cloth-backed abrasive belts of any grit, 3 in. wide by 24 in. long, are used on the sander, and can instantly be changed by means of a new fingertip lever arrangement. To assure proper cooling of the powerful  $\frac{3}{4}$  h.p. universal motor that drives the belt, the frame is mechanically designed with front intake

slots which permit the air ample circulation area to absorb and carry away the heat. The belt travels 1350 ft. per minute over the flat shoe, thus assuring



Porter-Cable Type T-33 Take-About Sander

fast, smooth results. A shoe pad is available for sanding slightly curved surfaces. A bench stand for holding the sander on its side so that the front pulley may be used as a spindle sander can be supplied.

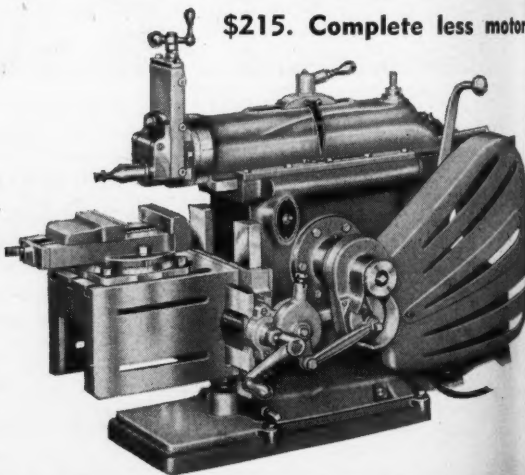
For both appearance and utility, the

## THE

# Atlas SHAPER

Handling the full range of shaping operations up to 7", this new Atlas Shaper provides an easy way to cut costs in tool room and shop.

Drive is standard bull-gear type powered completely by V-belts—4 speeds, 5 feeds—requires but  $\frac{1}{2}$  H.P. motor. Write for complete details.



\$215. Complete less motor



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APERS



**"A tip from a  
BATH tap engineer  
saved us a lot of money"**

**"WE** struck a snag on our last tapping job. Taps seemed to be breaking for no reason at all and the spoiled work was piling up. About that time a BATH engineer dropped in and we asked him for a little advice.

"Well, he looked around for awhile and suggested a change here and one there and when he was through, a blind man could see how much faster the work was moving. And the threads were better too. He fixed up our trouble and saved us money to boot."

There's a BATH engineer in your vicinity who will be glad to give YOUR tapping problems the benefit of his training and experience. Don't wait until you run into trouble—call him now—there's no obligation.

**JOHN BATH & CO.**

WORCESTER • MASSACHUSETTS

*Pioneers in*

**"GROUND FROM THE SOLID" TAPS**

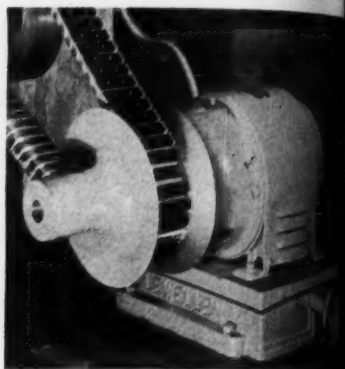
Type T-33 has a streamlined, highly polished aluminum frame with cast plastic front and rear handles. Being but  $4\frac{3}{4}$  in. wide by  $7\frac{1}{2}$  in. high by  $14\frac{3}{4}$  in. long, and weighing only 16 lbs., the sander is extremely easy to handle and use efficiently. The equipment includes six assorted abrasive belts and 15 ft. of rubber armored cable fitted with proper unbreakable connecting plugs.

### Lewellen Variable Speed Motor Pulley

The Lewellen Manufacturing Co., Columbus, Ind., has augmented its line of power transmission equipment by the addition of the Lewellen Variable Speed Motor Pulley illustrated herewith. The pulley fits the shaft of a standard motor and drives directly to a pulley or sheave on the driven shaft. The motor and pulley are mounted on an adjustable base, thus permitting infinite variation of the speed of the driven shaft.

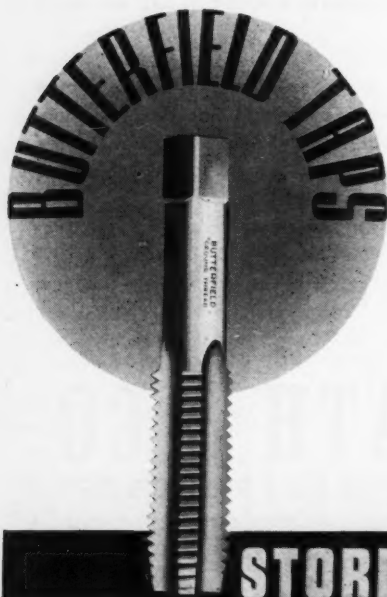
Features of the pulley, which is modern in appearance and design, include positive equalized disc travel in both directions, thus maintaining the belt in the same position at all diameters; a uniform low spring pressure at all pulley diameters without buckling the belt;

hardened steel driving members with ample bearing areas; pressure lubrication to all bearing surfaces, with all water



Lewellen Variable Speed Motor Pulley

parts, including the spring, completely enclosed to keep grease in and dirt out and high tensile castings with all surfaces machined, making a light-weight, safe, smooth-running drive.



You don't buy taps.

You buy threads, tap life and the resulting profits that taps give you.

Compare Butterfield taps with other taps for accurate threads and long life. The difference will reveal the superiority of Butterfield Taps and their profit possibilities.

Compare — Buy — Profit.

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**BUTTERFIELD DIVISION**  
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# A HUSKY DRILL

for  
Heavy  
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Footburt Sensitive Drills are built rigidly enough to maintain accuracy over a great many years. With the addition of the back gear unit, larger counter-sinking and spotfacing operations on tool steel are possible.

The No. 2 machine is a "Full Range Drill".

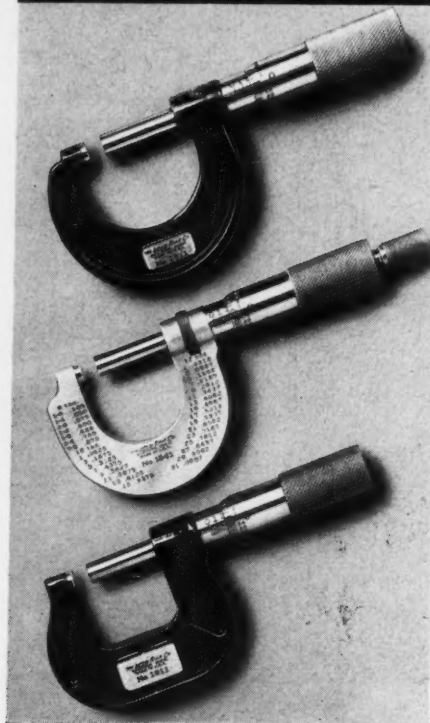
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**THE FOOTE-BURT COMPANY**  
CLEVELAND, OHIO

Detroit Office: 4-151 General Motors Building

**FOOTBURT SIPP SENSITIVE DRILLS**

## LUFKIN MICROMETERS



They are made from the finest materials especially selected for a long life of precision duty. The most careful workmanship goes into them. With their exclusive features it is most simple to take readings accurately and quickly. That's why we say they're the world's finest mikes.

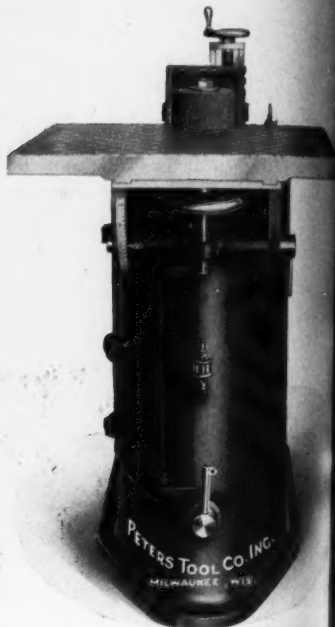
Write for free catalog No. 7.

## LUFKIN

SAGINAW, MICHIGAN • New York City

## Peters Vertical Oscillatory Grinder

To simplify the grinding and straightening of tools and dies, Peters Tool Company, Inc., 114 E. Scott St., Milwaukee, Wis., has brought out the Peters Vertical Oscillatory Grinder illustrated here with. The machine was designed for precision operation based on a slow oscillatory movement which is said



Peters Vertical Oscillatory Grinder

produce straight, smooth, square surfaces with all lines eliminated. The table can be adjusted for finishing work at any desired angle. The machine is especially adaptable for use on form tools including tungsten carbide.

The grinder is of simple and compact design and construction. Bearings of the taper take-up type with large chambers and all bearings and wear surfaces are completely enclosed. The oscillating mechanism runs in oil, and every precaution in design has been taken to eliminate wear. The oscillating movement can be stopped for using the tools or to dress the wheel by a simple movement of one lever.

The grinder is powered by a 1½ h.p. Allis-Chalmers ball bearing A.C. motor.

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## Production Costs Cut with Ryerson Alloy Steels

You can depend on better results in less time when your heat treater is guided by the Ryerson data charts. These charts show him the exact properties of the steel with which he is working and tell him how to get the desired results. He does not have to test. He takes no chances. Spoilage is eliminated and a sound dependable job of high accuracy and uniformity assured.

In addition to saving in production costs, the Ryerson Certified Alloy plan benefits the Purchasing Department as they can keep a detailed record of the exact analysis of every alloy purchased. Thus it is possible to duplicate particularly desirable close range specifications on repeat orders.

The Metallurgical Department is benefited too for they can call for any reasonable physical treatment and be sure the Heat Treater can produce the desired result.

Ryerson Certified Steels also include carbon, tool and stainless steel that meet definite quality standards. They offer many advantages to steel users. Let us tell you the complete story.

Write for booklet.

Joseph T. Ryerson & Son, Inc.,  
Plants at: Chicago, Milwaukee,  
St. Louis, Cincinnati, Detroit,  
Cleveland, Buffalo, Boston, Phila-  
delphia, Jersey City.

# RYERSON

*Certified*

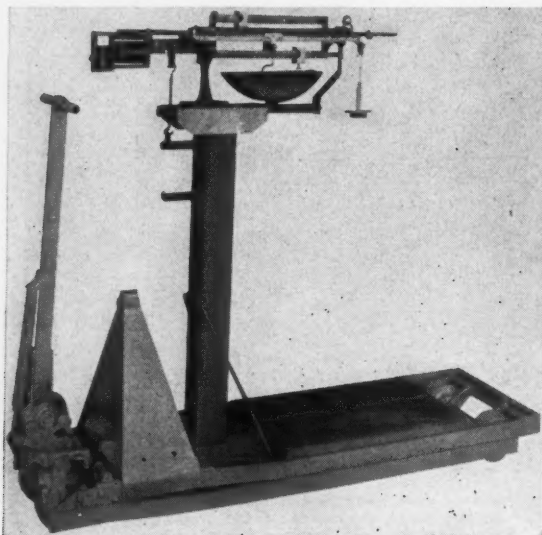
# STEELS



220 volt, 60 cycle, from which power is transmitted through a double texrope drive. The speed of the grinding wheel is 5000 r.p.m. Floor space required, 24x35 in. Weight, approximately 925 pounds.

### Yale Blue Streak Scale Truck

A lift truck carrying a scale with a capacity of 1000 lbs. has been brought out by The Yale & Towne Mfg. Co., Phila-



Yale Blue Streak Scale Truck

delphia, Pa. The scale, product of International Business Machines Company, is said to be very accurate and highly sensitive. The lift is compounded so that a single stroke will quickly raise the load.

Ball bearing rubber-tired wheels provide for easy pull and floor protection and the tires also absorb the jar that would otherwise reach the scale mechanism.

The unit is intended for weighing small machined parts for stock counting or to determine wage credit. The use of this truck is said to simplify operation, increase accuracy and save time on the flow of production through the shop. The truck is available in greater capacities and frame heights ranging from 7 to 12 inches.

### "Pen-Kay" Fast Bath Carburizer

A fast bath carburizer with such flexibility that it may be used effectively on both light case hardening operations usually associated with cyanide and the deeper penetrations formerly obtainable only by the use of pack carburizing methods has been developed by Heatbath Corporation, Springfield, Mass. Known as the "Pen-Kay" process, the bath is composed of scientifically proportioned ingredients in which the only requirement is a pot-type furnace of suitable size and capacity.

The material comes in the form of lumps which are melted in the furnace and mechanically, is used in the same way as cyanide. The liquid is brought to a heat of 1400 deg. F. to 1650 deg. F. and the work is immersed for a sufficient time to attain the desired depth of case. After the Pen-Kay bath has completed its work, all that is necessary after oil quenching is a wash in

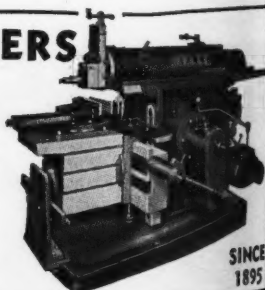


## CRANK SHAPERS HEAVY DUTY

Made in six sizes from 16" to 36" stroke, with motor or Single Pulley Drive. Revolving table and front support form part of standard equipment. Timken Roller Bearings throughout.

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**GENERAL ENGINEERING & MFG. CO.**  
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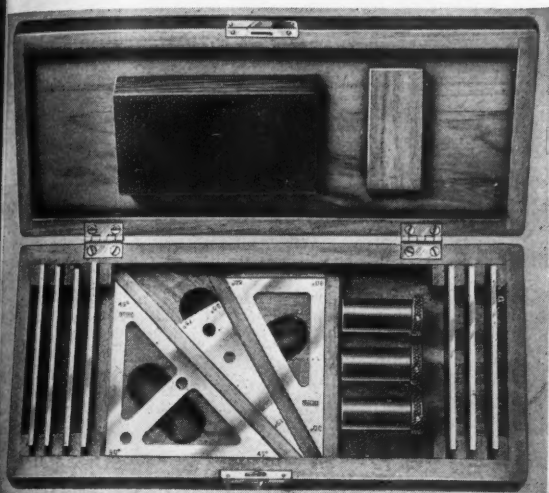
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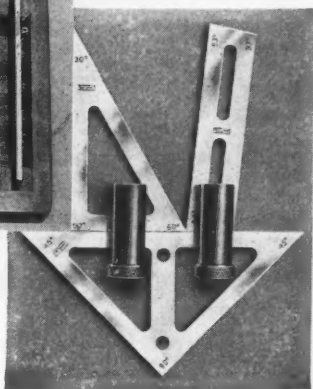
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# New TAFT-PEIRCE UNIVERSAL ANGLE GAGES



*Below — Combination  
of Taft-Peirce Univer-  
sal Angle Gages Set to  
Produce an Angle of 36°*



*... accurately produce  
any angle between 0° and  
180° . . . by 5' Increments*

Applied directly to the work—without any obstruction—this new set of patented universal angle gages marks a definite improvement over protractors or other means of measuring and laying out angles.

The complete set shown, comprises 10 independent angle gages . . . 7 of which are parallel blades with a pair of supplementary angles on each end . . . and 3 of which are triangles. The universal angle members are fixed in combination for convenient handling and

use by an ingenious clamping device, 3 of which are provided in each set, as shown. All gages are made of tool steel, hardened and precision-ground so that variation from exact angle of any combination will not exceed 1'.

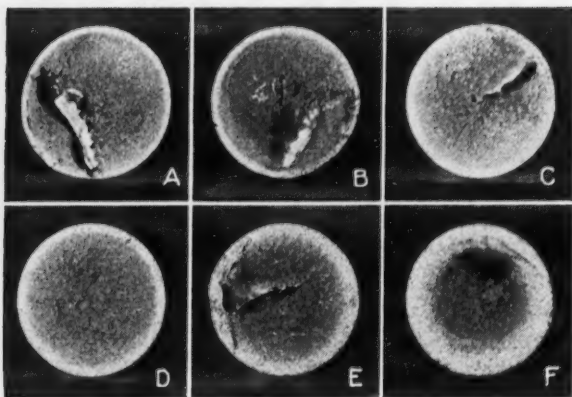
A set of Taft-Peirce Universal Angle Gages will be highly useful in tool-rooms, die shops, manufacturing and inspection departments, for laying out and checking all angles. Each set packed in hard wood case, complete with instructions. **WRITE FOR PRICES.**

**THE TAFT-PEIRCE MFG. CO.**

Woonsocket



Rhode Island



Examples of Case Produced by Pen-Kay Fast Bath Carburizer on  $\frac{3}{8}$ -in. SAE 1020 Cold Rolled Steel. Enlargement X2. A—30 minutes at 1650 deg. F.; Penetration, 0.01541 in. B—One hour at 1650 deg. F.; 0.02211 in. C—One hour and 30 minutes at 1650 deg. F.; 0.02814 in. D—Two hours at 1650 deg. F.; 0.03551 in. E—Four hours at 1650 deg. F.; 0.05494 in. F—10 hours at 1650 deg. F.

water to remove the surplus.

Pen-Kay is said to contain no calcium or other insoluble ingredients; it is soluble in water and washes off per-

fectly from an oil quenchant without recourse to chemical solvents. It is said to produce a glass-hard case of approximately 30 to 1.20 carbon content and on ordinary work a case of 0.015 in. can be obtained in a 30-minute immersion. Pen-Kay does not boil out of the work, does not precipitate in the form of heavy sludge, does not gather moisture, does not throw off excessive fumes, smoke, dust, and leaves no white deposit on water quenched work.

### Continental Band Filing Machine

The band filing machine shown in the illustration has been placed on the market by Continental Machine Specialties, Inc., 1901 Washington Ave., Minneapolis, Minn. A feature of the machine is the file band which is a Swedish flexible spring steel band to which are riveted short

## Tool Troubles Vanish When OLIVER Machines Are Installed

Many production failures are traceable to incorrect reconditioning of cutting tools. Only properly ground tools will keep your high production machines "on their toes". Oliver grinders will eliminate tool failures in your plant as users the country over will testify.

### OLIVER DRILL POINTERS

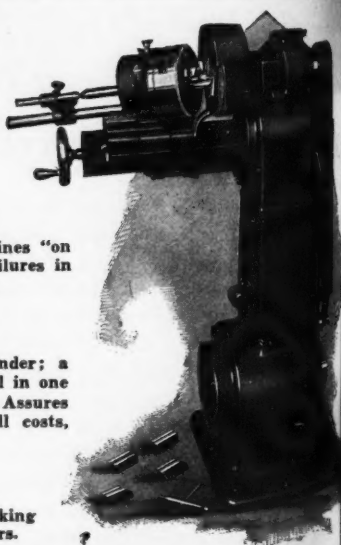
The cut illustrates the Oliver patented Drill Grinder; a machine that generates correct lip form on the drill in one operation. Grinds the patented Oliver drill point. Assures greater number of holes per grind, saves on drill costs, spoiled work, etc. Available in 4 sizes.

### THE OLIVER LINE

Face Mill Grinders, Twist Drill Grinders, Die Making Machines, Cutter Grinders, Precision Tool Grinders.

## OLIVER INSTRUMENT COMPANY

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ADRIAN, MICHIGAN



# FLEXIBLE SHAFTING is ideal for jobs like this

The problem of making a 90° turn in the vernier slide control of this analytical balance is neatly solved with a short piece of S. S. WHITE flexible shafting.

*It is safe to say this is the simplest and most economical way to make that turn—or, in fact, to couple parts that are out of alignment to any extent.*

So, keep S. S. WHITE flexible shafting in mind when you design. Remember, it is available in a wide range of sizes and physical characteristics—in both power drive and remote control types—and in any length.

## ENGINEERING COOPERATION

Always available, without obligation, for working out specific power drive applications. Just send us essential data.

Analytical Balance (patented) product of Seeder-Kahlbach, Inc., Jersey City, N. J. Photo courtesy of the manufacturer.

Periodically we publish flexible shaft information and engineering data. If you have copies, write us to put your name on our mailing list.

# S. S. WHITE

The S. S. White Dental Mfg. Co.

## INDUSTRIAL DIVISION

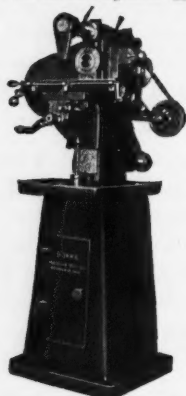
10 East 40th St., Room 2310S, New York, N. Y.

ments of special files. When the band flexes around the upper or lower wheel pulley, the file segments open, closing as they leave the wheel to form a continuous rigid filing surface at the point of work. A narrow support is provided behind the file at this point.

The file band is supplied in a variety of standard cuts and shapes,  $\frac{3}{8}$  or  $\frac{1}{4}$  in. wide. A Vixen file is also provided, cut with very large milled teeth, the action of which is more like a milling cutter or broaching cutter than a file, and which is used for dressing brass, aluminum,

copper, and so on. The file assortment includes files for use on high carbon steel, aluminum, plastics, or any metal or alloy. It is stated that the file band

## BURKE Milling Machines



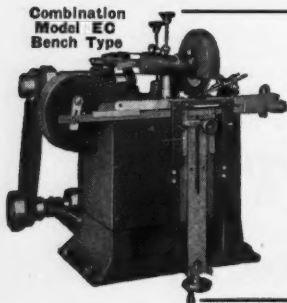
Burke motor driven milling machines, Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

**BURKE MACHINE TOOL CO.**

297 E. 16th St. Conneaut, Ohio

Combination  
Model EC  
Bench Type



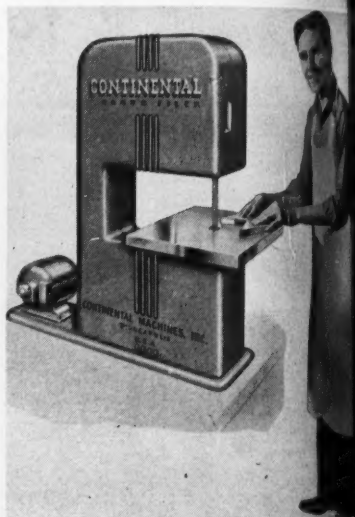
## SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING  
HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information.

**THE WARDWELL MFG. CO.** 3166 Fulton Rd. Cleveland, O.



Continental Band Filer

economical to use as a result of the long life which is due, in part, to the fact that the band cuts in one direction only eliminating the backstroke.

The band filer can be operated at the correct speed for each job, and the filer exert a steady pressure. File bands can be changed quickly to suit the job to be filed, due to the fact that the upper wheel has a 2-in. up and down adjustment and hand wheel. The file band driven by a special rubber-faced pulley providing a positive drive. Power is sup-



# NO LABOR COST HERE!



## HOW TO PUT IDLE TIME TO WORK

This photograph shows the milling and drilling of an overarm for a scroll saw. The operator loads the arm in the milling machine, starts the first cut, then loads a previously milled arm into the special drilling fixture set beside the milling machine and drills four holes in the arm. By the time this operation is completed the first cut is finished on the milling machine. The arm on the milling machine is then indexed for the second cut, and, while this cut is being made, the operator transfers the drilled arm

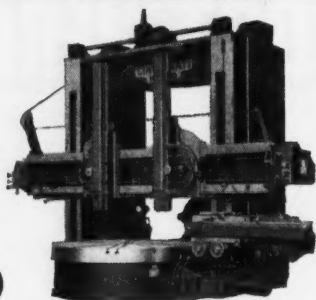
to another Delta drill and taps two holes. The drilling and tapping operations are done during the time that the operator would otherwise be idle—so these operations cost nothing for labor!

The portability and adaptability of Delta drill presses, which enable them to be set up alongside another machine to utilize idle time, are only two of the many advantages offered by this low-cost, high-efficiency equipment.

Let us tell you more about how Delta Drills will save money in YOUR plant.

**DELTA MFG. CO.**

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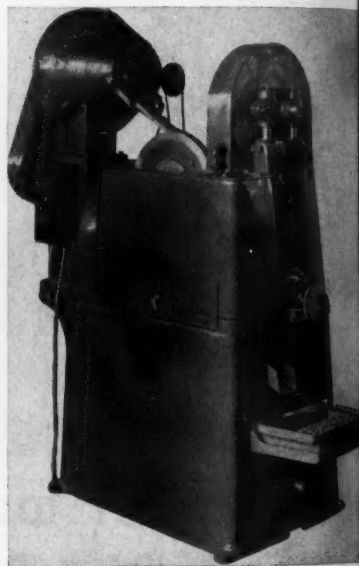
Write for literature — and don't forget to send samples.

**THE GRANT MFG. & MACHINE CO.**  
 96 Silliman Ave. Bridgeport, Conn.

plied by a  $\frac{1}{4}$  h.p. motor, mounted on the rear of the machine, from which power is transmitted to the file pulley by V-belt. The 12-in. work table can be tilted in two directions for filing at an angle. All working parts are completely housed and sealed ball bearings are employed throughout. The height of the machine is 32 in. and the weight is 12 lbs. Ask for bulletin No. BF-62.

## Lindgren Automatic Screw-Slotting Machine

Lindgren & Son Mfg. Co., 751 Center Ave., Bridgeport, Conn., has developed an automatic machine for the slotting



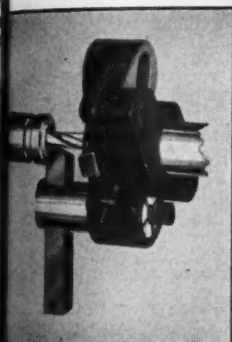
Lindgren Automatic Screw-Slotting Machine

of screw heads and similar work. The machine as shown is arranged for slotting special brass electrical binding screws, which are automatically hoisted, clamped, slotted and ejected at a high rate of production.

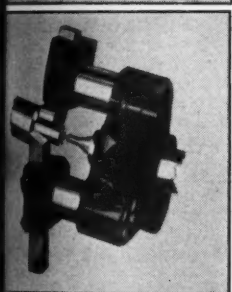
Instead of the customary screw slotting cutters, the machine is arranged with a  $\frac{5}{8}$  in. width, 6 ft. 10 in. length band saw which gives unusually long cutting service. A big improvement to the bottom of the slot is noted over the customary slot which assumes the radi-

# R 2 or 3 operations at one time L

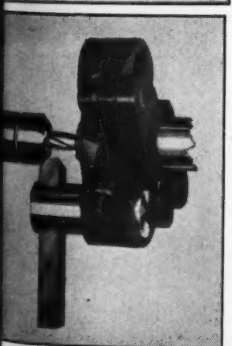
RIGHT LEFT



Turning and forming special shape while drilling or reaming.



Turning and centering.



Drilling and chamfering.

For you, this means increased production, lower costs and greater profits.

The illustrations at the left show a few of the many multiple operations of the R & L Tool.

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## R&L TOOLS

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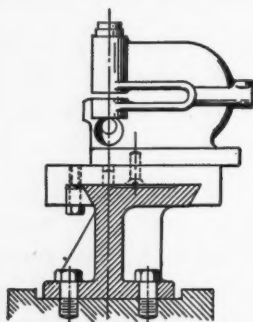
of the usual 2 3/4 in. diameter cutter, whereas the method employed in this machine maintains the outside radius of the 15 in. diameter work carrier in the bottom of the slot, thereby making it practically flat.

The screws are automatically fed from the hopper into a chute, transferred into a continuously revolving work carrier, automatically clamped and passed by the band saw cutting the slot, unclamped and ejected into a work pan outside the machine. Adjustment of the work carrier is easily made to allow for different size screws and extra work car-

riers can be furnished to handle a larger variety of different sizes.

The machine is driven by a 1 h.p. 1150 r.p.m. motor and coolant is supplied to the saw through a gear-driven pump from the coolant tank located in the base of the machine. Necessary adjustments for depth of slot, center and clamping are conveniently provided. The entire machine is constructed as simply as possible to eliminate the necessity of frequent attention and adjustment. An important feature is the absence of any indexing or timing mechanisms. The use of the machine is not entirely limited to the slotting of screw heads but can be adapted to other types of work not necessarily hopper fed.

## WALES PRESS BRAKE DIES



Std. individual, sub-press type hole-punching and notching dies mounted on adapters give fast and easy lengthwise adjustment.

*Write for Bulletin A.*

**THE STRIPPIT CORPORATION**  
1559 NIAGARA ST. BUFFALO, N. Y.

## Maag Helical and Spur Gear Grinding Machine

The illustration shows the Type H88-Maag Gear Grinding Machine which is now being marketed in this country by Triplex Machine Tool Corporation, 12 Barclay St., New York, N. Y. This machine is designed for grinding the teeth of spur and helical gears up to 24 in. in diameter.

The main features of the Maag Gear Grinding Machine are simultaneous grinding of both flanks of a tooth or of two adjoining flanks of two teeth, automatic compensation for wear of the grinding wheels, high number of generating motions per minute, simultaneous grinding of several gears as a result of axial feed motion, adjustable dividing device which enables spacing in front and in back of the gear or at both sides, automatic device for stopping after roughing and finishing operations, uninterrupted work owing to simplification of fixing operation by means of the setting apparatus, and accessibility of all operating levers and buttons.

The Maag machine is said to produce work of high accuracy, due both to the

## Set-up Time Becomes Production Time

Walker Magnetic Chucks save from 20% to 50% in chucking labor by eliminating slow-acting jigs and fixtures for metal removing operations on lathes, shapers, drills, presses, planers, grinders, etc. Write for catalog W 3.

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Available in sizes 4x8 to 30x96.

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# 8 out of 14

## LEADING MAKERS\* of MACHINE TOOL REAMERS

..... use **OAKITE** *Certified Cleaning*

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The right steels, scientific heat treatment, correct design and precision grinding . . . these are the important factors in producing reamers that will stand up under rugged service and satisfactorily meet production requirements.

In this connection it is significant that EIGHT of fourteen leading makers of machine tool reamers use Oakite materials either for making up grinding compounds where close tolerance and finish are essential in producing high grade work; or, for cleaning the rust proofing work between operations.

Dependability of results at low-cost, thorough and consistent performance day in

and day out are the reasons that prompt so many leading manufacturers today to specify and use Oakite materials and methods.

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Whether for cleaning, for rust proofing, for making up your own grinding or cutting compounds, you will find that among the more than 53 different Oakite materials produced, there is one that will meet your requirements for fast, effective results at low-cost plus safety to product, equipment and workmen. Let us give you specific recommendations on your work. Won't you write today?

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**OAKITE**  
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FOR EVERY CLEANING REQUIREMENT

principles upon which the machine is designed and to careful construction.

The Maag Gear Grinding Machine works on the generating principle, the involute flanks being produced by a motion which is obtained through the use of a cylindrical pitch block rolling together with the gear blank. The tooth flanks are moved across the edges of two

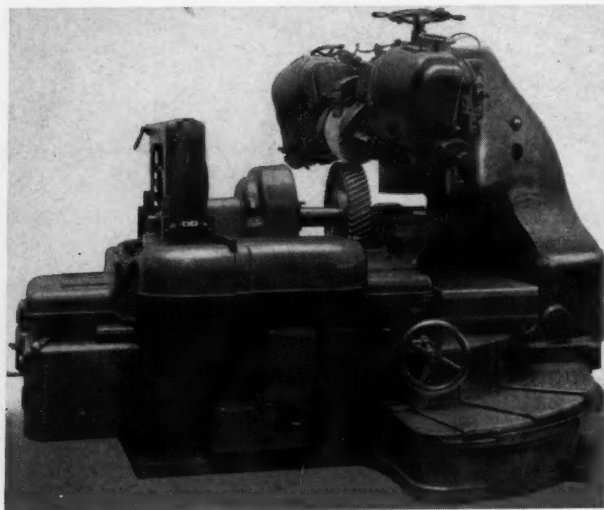
roughing out, the generating motion stopped automatically to prepare for finishing or to allow for measurements.

The gear blanks are generally mounted for grinding on conical or cylindrical mandrels which are swung between centers. All mandrels and sleeves are hardened and ground.

On all Maag Gear Grinding Machines

the grinding is done by means of two saucer-shaped wheels the outer edges of which touch the flanks of the teeth. When rotating, the edges form a circle and the two planes containing the circles may be considered as the flanks of a corresponding gear tooth upon which the gear blank is rotated during the grinding process. Thus two correct involute flanks are produced simultaneously. The automatic device for compensating wear of grinding wheels ensures the permanent position of both grinding circles or planes with regard to the blank.

Variations in the rates of feed from 0.042 to 0.145 in. every simple generating motion can be obtained. The length of feed is limited by adjustable stops. The generating slide is mounted on the feed slide and driven by the main shaft and a gear plate. The number per minute of simple generating motions is controlled

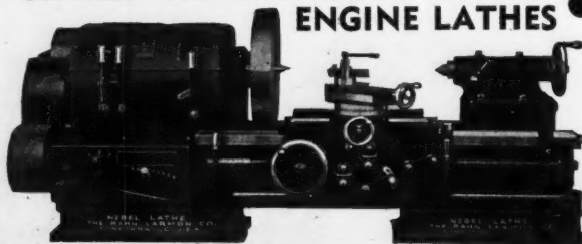


Maag Helical and Spur Gear Grinding Machine

grinding wheels, the grinding circles of these wheels representing the flanks of a rack meshing with the blank. Besides the generating motion, the gear blank receives a straight feed motion in the direction of its axis in such manner that the grinding disks gradually touch the whole width of the tooth flanks. The indexing of the gear is automatic and after

change gears by which eight different rates of feed from 0.042 to 0.145 in. every simple generating motion can be obtained. The length of feed is limited by adjustable stops. The generating slide is mounted on the feed slide and driven by the main shaft and a gear plate. The number per minute of simple generating motions is controlled

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### Cooper Hewitt Mercury Lighting

Take it from the man at the bench or on the assembly line—the sharp, clean-cut clarity of sight under Cooper Hewitt lamps still ranks as “tops” for precision work in industry.

These long-tube light sources are naturally low in watt-factor; thus, the high illumination levels required for checking fine detail can be achieved without eye-babbling reflections from bright metal parts. Shadows are virtually non-existent. There's a sense of coolness about Cooper Hewitt light that makes for physical as well as visual comfort.

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22% more efficient than previous types . . . “high seeability” lighting for inspection or production areas is less expensive than ever before. Plants where costs are known down to the last penny are installing Cooper Hewitts right now—as a means of spreading slim modernization budgets wisely as well as widely throughout the plant.

Why not discuss the possibilities of similar gains in your own plant with a representative who knows the economics as well as the engineering of modern industrial lighting? General Electric Vapor Lamp Company, 897 Adams Street, Hoboken, New Jersey.

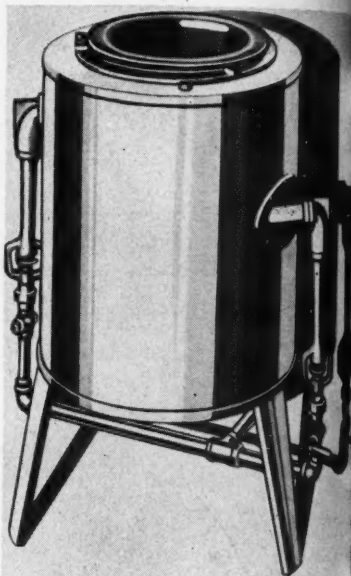
**GENERAL  ELECTRIC**  
**VAPOR LAMP COMPANY**

by a five-step cone pulley and the maximum length by the cam plate. The generating slide carries the generating spindle, supporting in its outer end the pitch block by which the four steel bands are connected to the pitch block stand mounted on the feed slide. By this means the straight alternating motion of the generating slide is converted into a swinging generating motion of the gear blank. The machine is supplied with four tri-phase current motors of normal voltage and periodicity, two of which serve the grinding spindles, a third the main shaft in the drive box, and the fourth the dust suction device. Two switches are

provided, one for the grinding spindles, the dust suction motors and the accumulator, and the other for the main motor.

### Holden Gas Furnace

A small gas furnace so designed that it requires no auxiliary air is now being marketed by A. F. Holden Company.



Holden Gas Furnace

New Haven, Conn. The furnace is made in three sizes to take the following sizes of pots: 8x12, 10x14 and 12x16 in. The feature of the unit consists in that it can be automatically controlled at low cost because only the gas flow is necessary.

### Investigate and Specify Incorporate — And They'll Satisfy

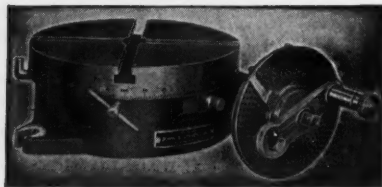


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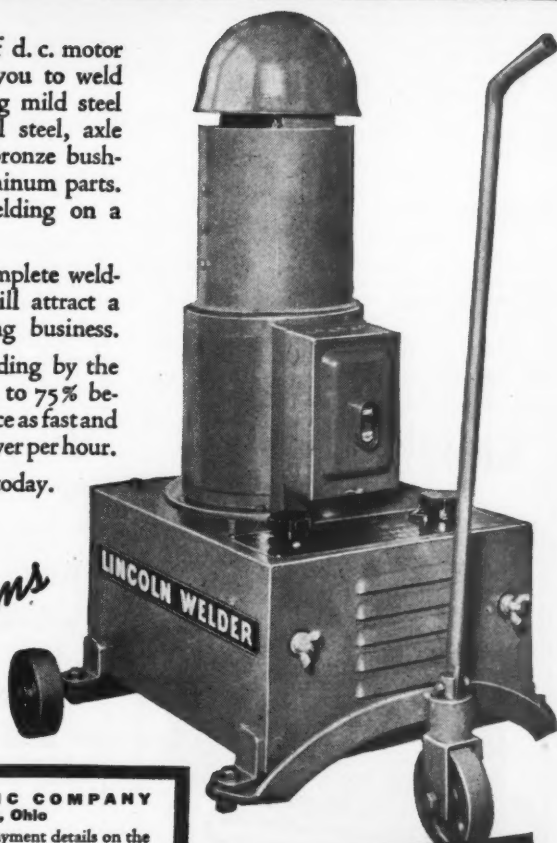
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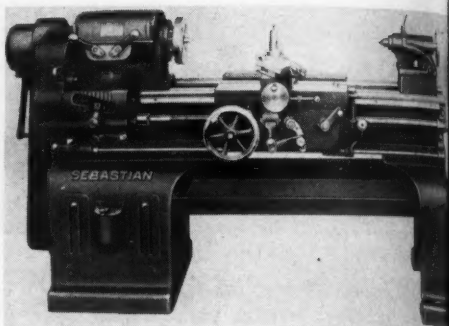
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LARGEST MANUFACTURERS OF ARC  
WELDING EQUIPMENT IN THE WORLD

for control so that a complete unit is available with automatic controls including control valve, nickel thermocouple, lead wire, and so on.

The flexibility of the unit combined with its economical cost will make it possible for many of the smaller shops to make use of this equipment for case hardening or for heat treatment of tools. For hardening, this unit is not only practical, but as up-to-date as units that are much larger in size. The furnace can be used for temperatures from 300 deg., for tempering steel, up to 1650 deg. for carburizing or any Holden heat treating bath within this range.

### Sebastian Type H Geared Head Stremeline Lathe

The lathe illustrated is the Type H Geared Head Stremeline Lathe now being introduced by The Sebastian Lathe Company, Cincinnati, Ohio. The Type H lathe is said to be designed especially for power, flexibility and accuracy. One of the features of the lathe is the eight-

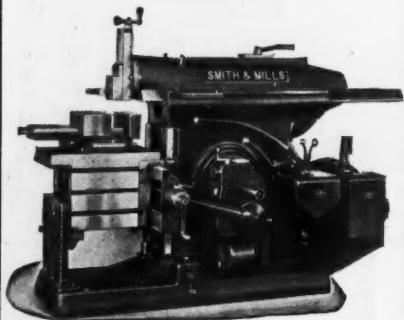


Sebastian Type H Geared Head Stremeline Lathe

speed geared headstock, the steel gear being made oversize, heat treated and hardened, and the shafts and spindle operating in Timken bearings. A large hole is provided through the spindle.

The lathe is powered by a motor, the leg from which power is transmitted to the spindle by either silent chain V-belt drive. A tumbler reverse plate provided for cutting left hand threads. Threads can be cut from 3 to 72. Seventy-two feed and thread change

## SMITH & MILLS SHAPERS



Automatic lubrication — forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

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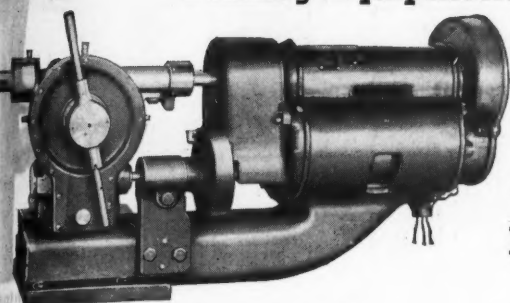
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ROCHESTER, N. Y.

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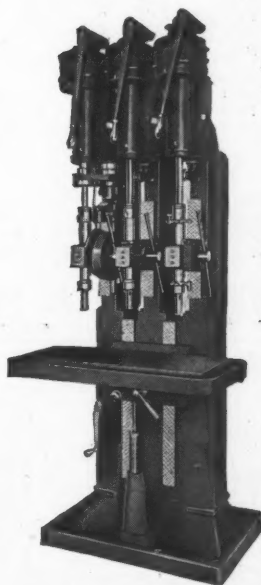
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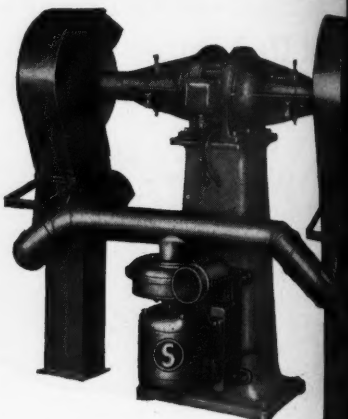
are available, from 0.00175 to 0.111 in. on the 12-in. lathe, and 0.002 to 0.252 on the 14, 16, 18 and 20-in. lathes. Accuracy is said to be maintained within 0.0005 in. at every point of alignment. Bronze shear wipers are provided on the carriage and tailstock. Both the threads and spline on the lead screw and the threads on the cross feed screw are chrome hardened, insuring accuracy and wear. The tailstock spindle is also chrome hardened. All controls, knobs and handles are chromium plated.

Regular equipment includes the motor, reversing switch, chip pan, wiring, steady

rest, threading dial, depth thread stop, centers, two face plates, and wrenches.

### "Standard" Exhauster Equipment

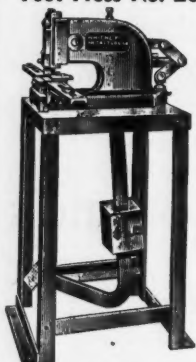
The Standard Electrical Tool Company, Eighth & Evans Sts., Cincinnati, Ohio, announces an exhauster which can be adapted to any make of grinding, buffing



Rear View of Standard 2 H.P. Polishing and Buffing Machine Showing Exhauster Equipment

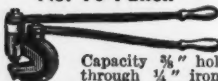
or polishing machine. The exhaust blower is powered by a 3600 r.p.m. motor, motor and blower being mounted on common base and attached to the back of the pedestal. The blower motor is controlled by a separate push button manual starter at the front of the pedestal. If preferred, the blower motor and blower motor may be connected so that the two units operate simultaneously through the magnetic starter located in the base of the machine. The unit is furnished

#### Foot Press No. 28



Capacity 2" hole in 16 gauge — 100 holes per minute.

#### No. 10 Punch



Capacity  $\frac{3}{8}$ " hole through  $\frac{1}{4}$ " iron. Weight 8  $\frac{3}{4}$  lbs.

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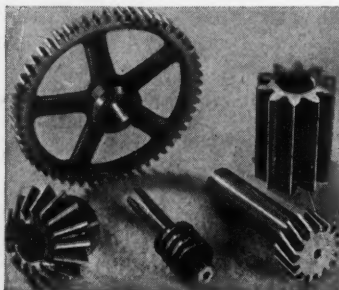


capacity 2x2  $\frac{1}{4}$ " Angle Iron Weight 4.4 lbs.

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91 FORBES ST. ROCKFORD, ILL.



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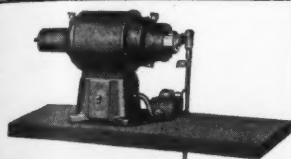
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Just the tools for Finishing, Polishing or Lapping of small parts.

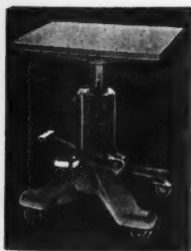
The very tools you've been looking for to produce those small parts quickly and economically. Eliminates setting up larger equipment with its slow and make-shift production methods. Built-in features of this new tool allow you to handle rod, tube and chuck stock better than ever before. Send for Circular 351.

Hand, foot or air operated 3-jaw chucks. Hand or Foot operated collet, sizes from 1/8" to 1 1/2". 1/2 or 1/4 h.p. AC or DC 2 speed motor. Steel bed plate or bench optional.

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No grouping of three or four men to lift and struggle with heavy parts. The modern way of moving heavy parts to different levels. These tables are built by tool engineers who have long designed and produced special machines, dies, jigs and fixtures to exact specifications.

No inquiries too small, no orders too large to receive our usual prompt attention.

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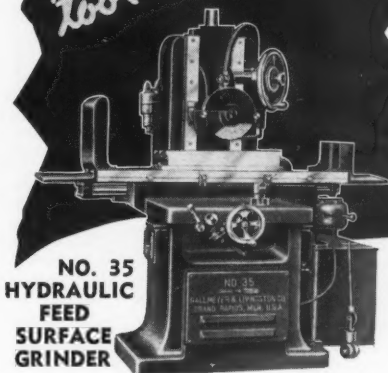
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112 Webster Street

Dayton, Ohio

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*for production and tool room grinding*



**NO. 35  
HYDRAULIC  
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- A speedy grinder—extremely flexible—for production tool room grinding.

Longitudinal and transverse table movements operated hydraulically, any speed can be obtained up to the maximum of 115 feet per minute.

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**Gallmeyer & Livingston Co.**

308 STRAIGHT AVE., S. W.  
GRAND RAPIDS, MICH.

complete as illustrated, including adjustable hoods and the necessary piping.

The blower was developed to provide for the collection of dust and refuse from grinding, buffing and polishing equipment when the location of the machine is remote from the regular exhaust system. An air filtering stand is available for connection to the exhaust blower. This stand is located at the rear of the machine and collects all refuse while the air leaves the stand in a clean condition.

### U. S. Model No. 68 Grinder

The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio, announces the Model No. 68 Grinder which is claimed to cut grinding costs and increase production, add longer wheel life and remove more pounds per dollar wheel cost. These factors are the result of constant wheel surface speed regardless of wheel diameter.

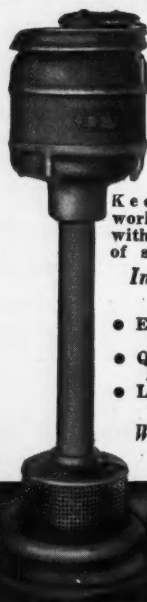
The features of the Model No. 68 Grinder are a constant speed motor, totally enclosed, ball bearing, fan-cooled, mounted on a hinged platform for belt adjustment; heavy wheel flanges keyed to the spindle, provided with adjustable weights, mounted in grooves for balancing grinding wheels; boiler plate wheel

guards adjustable to wheel wear with permanent exhaust connections; safety eye shields mounted on the guards; variable speed transmission interlocked



U. S. Model No. 68 Grinder

with the wheel guards with constant surface speed of the grinding wheel which prevents over-speeding; shaft coupling for quick change of belts; heavy chrome-manganese steel spindle which runs on four heavy duty bearings, enclosed in dust-proof housing with inner and outer labyrinth seals; heavy angle plate which supports the adjustable work rest, and a variable speed transmission.



## EMBY PUMPS

### SERIES 174

Keep expensive machines working at top efficiency with Emby Coolant Pumps of superior design.

*Internal or external mounting.*

- EFFICIENT
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### Improved Anderson Balancing Ways

No Leveling Required

A simple and excellent device for balancing, straightening and truing.

They are made in the following sizes:

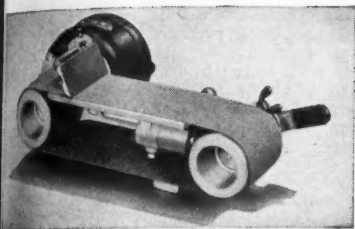
Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four-Chilled iron-discs rotate on sensitive Special bearings.

*Write for Full Information*

Made by **Anderson Bros. Mfg. Co.**  
1926 Kishwaukee St., Rockford, Ill.



## • NEW ABRASIVE BAND GRINDER . . .

*"Built Like a Machine Tool"*

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

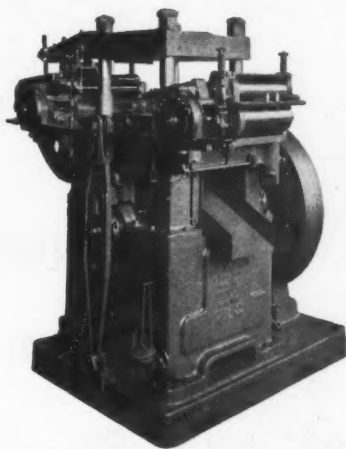
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### HORMEL-M GRINDER

WALLS SALES CORP.

66 WARREN ST. NEW YORK, N. Y.

**250 Pieces Per Minute**  
From .050 Cold Rolled Steel



## HENRY & WRIGHT High Speed Dieing Machine

### FEATURES —

Produces a large variety of stamped parts complete in a single operation in multiple station dies.

No costly hand-feeding operations.

Work is always readily accessible and visible to operator.

Die life increased 4 to 10 times.

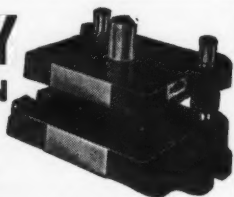
Flywheel, crankshaft and connection are *below* punchholder.

Low center of gravity allows high speed with minimum vibration.

*Write for catalog*

**THE HENRY & WRIGHT MFG. CO.**  
HARTFORD • CONN.

## DANLY PRECISION DIE SETS



**Danly All-Steel Sets**  
**Danly Commercial Sets**  
**Danly Die Makers' Supplies**

### DANLY SERVICE

8 Danly Warehouses Provide  
24-Hour Service for 85% of  
All Metal Fabricating Plants

### DANLY MACHINE SPECIALTIES, INC.

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Detroit, Michigan, 1549 Temple Avenue  
Rochester, N. Y., 18 Commercial Street  
Cleveland, Ohio, 1745 Rockwell Avenue  
Philadelphia, Pa., 3813 North Broad Street

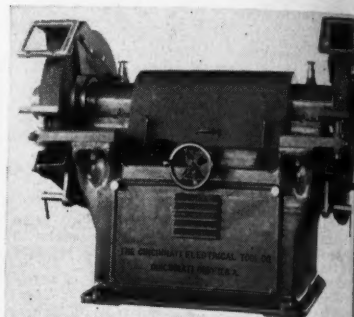
**DANLY DIE MAKERS' SUPPLIES**

The correct surface speed is said to be maintained at all times by increasing the r.p.m. of the spindle as the wheel wears down, providing new wheel efficiency regardless of wheel diameter. The tool is built with smooth, trim lines and no obstructions.

### "Cincinnati" Variable Speed Snagging Grinder

The Cincinnati Electrical Tool Company, Division of The R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, has announced a Variable Speed Snag-

ging Grinder which can be furnished for use with either high speed or vitrified grinding wheels and which ensures the correct peripheral speed for the entire life of the wheels. The grinder employs two adjustable pitch sheaves to provide the variable speed feature, one sheave being mounted on the motor shaft, the



"Cincinnati" Variable Speed Snagging Grinder



This machine quickly stamps details and serial numbers into name plates.

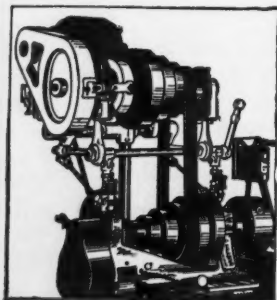
*Write for Particulars*

**GEO. T. SCHMIDT, Inc.**  
1806 Belle Plaine Ave., Chicago, Ill.

other on a countershaft within the pedestal of the grinder.

To increase the speed of the grinding to compensate for wheel wear it is necessary to start the motor and turn a conveniently located hand wheel, the front of the pedestal, to the right as far as the spark shields will permit without striking the grinding wheels. The adjustment of the pitch diameter of the pulleys is synchronized with the movement of the wheel guards and spark breakers and as the wheel guards move as one unit, it is impossible to overspeed the wheels. Provision for belt stretch or belt renewal is taken care of by means of two hinged and threaded studs on the front of the countershaft assembly which carries the pulleys.

Conveniently located oil gauges are provided on the bearing boxes and cou-



### 3 DAY DELIVERY

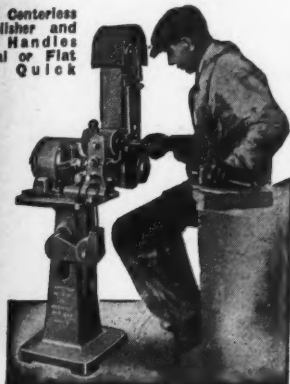
Do you want a motor drive in a hurry? You can buy a Remco Motor Drive, designed and engineered from standard parts to fit the specific dimensions of your lathe, milling machine, shaper, etc., and we'll ordinarily have the drive on its way to you within 3 days. Get details — write! Remco Products Corp., State & Hay Sts., York, Pa.

**REMCO MOTOR DRIVES**

## A Big Labor Saver for Grinding, Surfacing, Polishing

If you are interested in cutting costs and at the same time better work, you will thoroughly investigate this—

Type B Centerless  
Feed Polisher and  
Grinder. Handles  
cylindrical or Flat  
Work. Quick  
Changes.



**Production Machine Co.**  
GREENFIELD, MASS.

## JOHNSON DIE MILLER

### Two Spindles

One spindle is built into the knee beneath the vise table. The other, or top spindle, is mounted in a swinging head. This machine is designed for all types of rapid and accurate milling operations. Simple design—extremely rigid and efficient. Four spindle speeds from 400 to 1700 R.P.M.  $\frac{1}{2}$  H.P. motor—V-belt Drives—All ball-bearing equipped.

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**Johnson Tool Co., Inc.**  
East Providence Rhode Island

**BOYAR-SCHULTZ**

# PROFILE GRINDER

### With Sine Bar Adjustment

Fits right into the daily routine of the modern Tool and Die Shop, or any machine shop demanding grinding and fitting to close limits of accuracy.

Die clearances, irregular shapes, difficult contours and profiles are quickly and accurately GROUND instead of finished by the slow process of fitting by hand stoning.

Reciprocating spindle revolves at the high speed of approximately 20,000 R.P.M., giving a finely ground surface with even wear to grinding wheels.

This modern Machine Tool is designed, not only for difficult tool and die work, but for experimental and any other work requiring accurate grinding and fitting.



Write for Descriptive Circular

**BOYAR-SCHULTZ CORPORATION**  
2120 WALNUT STREET CHICAGO, ILLINOIS

tershaft assembly to show the proper oil level and drain plugs are furnished to facilitate the draining and changing of oil. A shaft locking device is provided to facilitate the changing of grinding wheels.

The wheel guards are of boiler plate with hinged covers and comply fully with the safety regulations of the American Standards Association for the Use, Care and Protection of Abrasive Wheels. Shatter-proof glass eye shields are furnished as standard equipment.

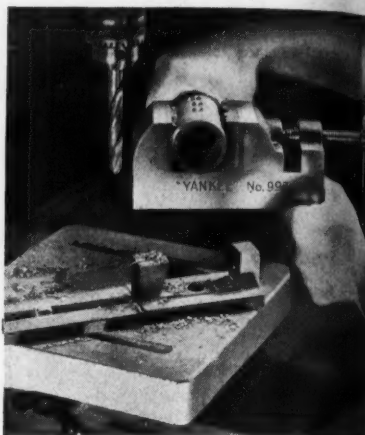
The grinder may be had to carry wheels up to 30-in. diameter with motors up to 15 h.p.

A fully enclosed fan-cooled ball bearing motor and magnetic starter with both overload and no voltage protection and push-button control are standard equipment.

### Yankee Vise and Vise Clamp

The "Yankee" Vise, product of North Bros. Mfg. Co., Dept. MS, Philadelphia, Pa., is now made in four sizes—with or without swivel base and in 1½, 2, 2¾, and 4-in. jaw widths. It is used in machine shops, tool rooms, repair shops, service departments, garages, home workshops and vocational schools. When used

on bench with swivel base, the "Yankee" Vise can be detached quickly, holding the work in original alignment, for con-



Yankee Vise and Vise Clamp

tinuous machine or hand operation. Sides, bottom and ends are accurately machined. The "Yankee" Vise may be used either on side or end, as well as on base.

Jaws are faced with hardened steel plates. The sliding jaw has a broad seat clamps evenly top and bottom, and does not spring away. Separate hardened steel plate with V-shaped grooves holds round stock or irregular shapes. The steel screw has a fine-pitch Acme thread and the swivel base can be locked at any position.

The "Yankee" Vise Clamp increases the utility of the "Yankee" Vise. The clamp rigidly holds the vise with the work for drilling and other machining, rendering machine operations easier and

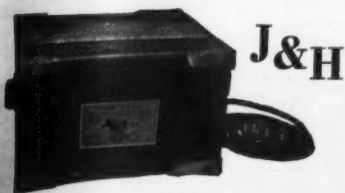




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FEEDS  
AUTOMATIC  
EQUIPMENT

THE V & O Press Co.  
HUDSON N. Y.





## The Demagnetizer

For Alternating Current

The J & H Demagnetizer requires no counter-shaft, belts, or other intricate electrical connections. All that is necessary is to plug it into the nearest lamp socket or receptacle.

It is of the new Unipole type — heavy duty — and can be supplied for either 110 or 220 volt alternating current. Size 12" long, 9" deep, 6" high. Weight 60 lbs.

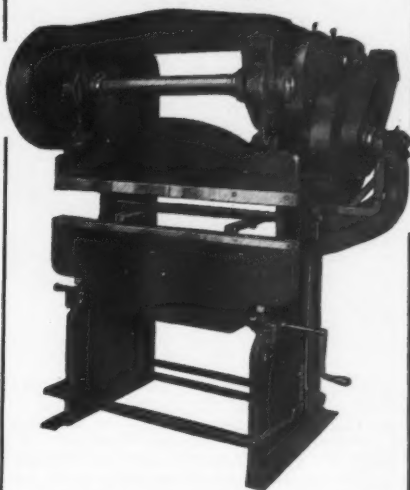
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**J. & H. ELECTRIC CO.**

32 Richmond Street, Providence, R. I.

## CHICAGO STEEL PRESS

No. 253



Does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities, up to 10 gauge.

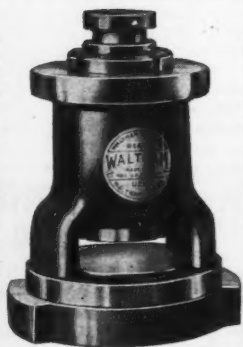
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**DREIS & KRUMP MFG. COMPANY**

7418 LOOMIS BLVD.  
CHICAGO ILLINOIS

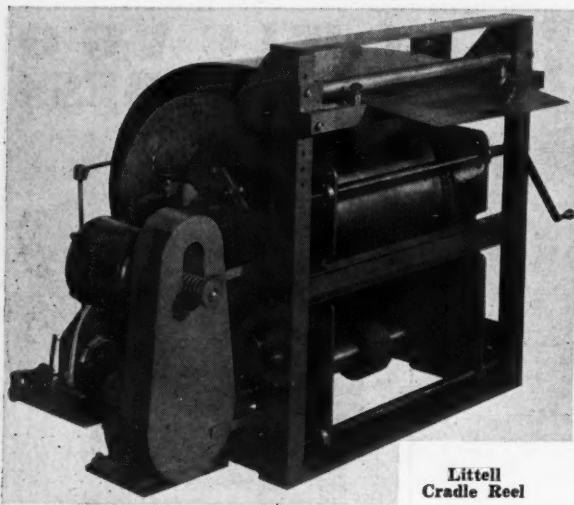
## CYLINDRICAL SUB-PRESSES

are especially desirable for producing clean cut, accurate parts with compound dies. For other operations, averaging, piercing, trimming, etc., the over-leaf type is preferred. We have had a long experience in making such dies. Please send us samples or drawings for estimate.



ARCH TYPE

**Waltham Machine Works**  
WALTHAM, MASS.



Littell  
Cradle Reel

assuring accuracy in results. The Vise Clamp is slotted for a  $\frac{3}{8}$ -in. machine bolt. Circular MS, describing all sizes and types of "Yankee" Vises and "Yankee" Vise Clamps, sent on request.

### Littell Motor-Driven Variable Speed Cradle Reel

The F. J. Littell Machine Co., 4163 Ravenswood Ave., Chicago, Ill., announces a motor-driven variable-speed Cradle Reel for holding coils of stock, for use with punch presses. This reel is well adapted for stock of light and medium thickness.

For accurate feeding it is absolutely necessary that the stock be taken from a loop and not directly from a coil. This reel is so designed that it unwinds a loop the size of which is controlled by

a roller control arm which stops and starts the motor.

One of its many features consists of two rotary plates which revolve with the stock as the stock is unreel. These plates prevent the edges of the stock from curling or being otherwise damaged as it is being taken off the reel. The guide plates are quickly adjustable back and forth for loading coils and for various widths of materials.

The coil driving rolls are made of wood or fibre. A variable speed drive is used so that the reel can be set to unwind the material at about the same speed at which the press feed is using the stock. Coils up to 3000 lbs., thirty inches wide

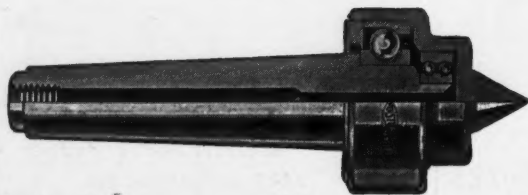
can be handled on this unit.

### Landis Beveling Unit

The Landis Machine Company, Wayneboro, Pa., has modified the construction of its line of pipe threading and cutting off machines which are equipped with a beveling unit. The new beveling unit is placed on the carriage immediately in front of the threading head. This change was made in order to ensure a more accurately formed beveled surface; one that would be suitable for high pressure pipe installations having flange joints upon which gaskets are used which seal against the beveled ends of the pipe.

In prior designs the beveling unit was placed back of the threading head, and the pipe overhung a considerable distance beyond the chuck jaws while the

## STURDIMATIC LIVE CENTER for LATHES, GRINDERS and MILLING MACHINES



STURDIMATIC TOOL COMPANY

It turns with the work. Eliminates friction of dead center. Lowest possible overhang prevents vibration and chatter.

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Drive  
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FREE—  
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## SMALL TOOLS

**Long Length Drills  
Special Size Taps  
Carried in Stock**

High speed and carbon drills, taps, reamers, milling cutters, hollow mills, and mills, drill rod, die sets, etc.

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**VICTOR MACHINERY EXCHANGE, Inc.**  
251 Center St.      New York City

## GITS Oilers



\* Your lubrication problems, whether large or small, will find the correct answer in the Gits Line. If your requirements are of special nature, send us your specifications.

**GITS BROS. MFG. CO.**

*27 years of oil cup experience*  
1846 S. Kilbourne Ave.      Chicago, Illinois

## NO MORE BROKEN SCREWS WHEN YOU STANDARDIZE ON MAC-ITS !

Troubled with broken screws, stripped threads or mushroomed points? Machining and heat-treating your own screws for tool posts and the like? Use stripper bolts, socket head cap screws, any kind of strong screws or studs?

Then save yourself time and money! Use Mac-its . . . 16 standard items, including 2 new lock screws. Special screws to specifications.

**The Strong, Carlisle & Hammond Co.**  
1392 West Third St., Cleveland, O.



Drive a 3/8" Mac-it square head set screw through a steel block! Send for free test samples. No obligation.

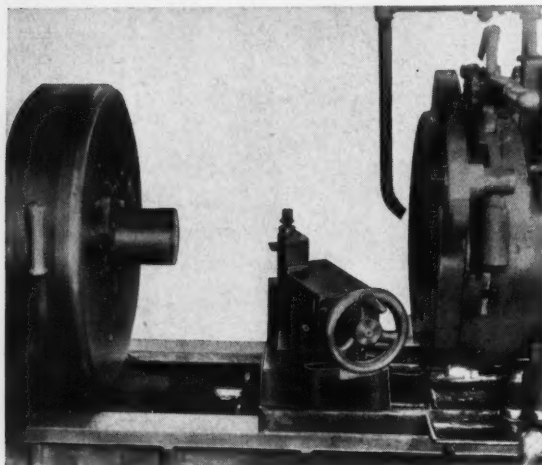
**FREE—Mac-it buyer's guide** to only complete line. Send today for Catalog 3812. No obligation.

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PRONOUNCED  
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**THE ONLY COMPLETE LINE OF  
HEAT-TREATED, ALLOY SCREWS**



beveling operation was being performed. This overhang can be materially reduced by the use of a pipe support; however, since the pipe may be somewhat out-of-round, the finished bevel is often un-



Landis Beveling Unit

suitable for application when it is utilized as a sealing surface. With the present arrangement, the pipe end overhangs the chuck jaws a relatively short distance. This arrangement is so rigid that an extremely accurate, smoothly finished bevel is said to be formed at all times. Where a thread is used in connection with the beveled surface, the bevel is absolutely concentric with the thread.

The beveling assembly is pivoted on a base which has been cast integral with the forward projection of the die head carriage. The base has a graduated scale to show the inclination of the tool as-

sembly with respect to the center line of the pipe. The tool holder slide has a dovetailed slot to engage the corresponding dovetail of the base member. A gap is provided so that the clearance between the dovetail and its slot can always be maintained at any desired value. Thrust collars are provided on the tool screw shaft to minimize wear between the shaft and the tool holder slide. The tool holder is thoroughly hardened so that the tool may be firmly clasped. After the bevel has been cut, the tool holder slide is retracted and the thread cutting operations may be started.

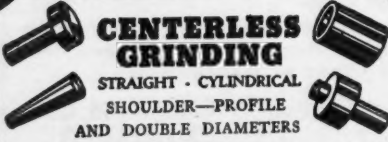
This beveling tool can be applied to the older models of Landis Pipe Threading and Cutting Off Machines.

### Production Millerette

An auxiliary unit designed to make possible a wide variety of milling and other operations when used in connection with a lathe drill press, shaper or planer has been brought out by

The Production Machine Tool Co., 812 E. Pearl St., Cincinnati, Ohio. The attachment, known as the "Millerette," is illustrated herewith.

The Millerette has a dovetailed base by which it can be located on the cross slide of a lathe and also has a special base by which it can be bolted to the table of any other type of machine. Both the body and the slide of the Millerette are of sturdy construction so that vibration is reduced to the minimum. The tool is adaptable to a wide variety of set-ups including an angle plate to which work can be bolted, a chuck, clamp



**CENTERLESS GRINDING**  
 STRAIGHT · CYLINDRICAL  
 SHOULDER—PROFILE  
 AND DOUBLE DIAMETERS

*All Kinds of Materials*  
**SCREW MACHINE PRODUCTS, HEAT-TREATED AND GROUND, IF NECESSARY**  
*Send Blueprints or Samples for Estimates*

**PORTER MACHINE COMPANY**  
 3130 FORNER AVE. CINCINNATI, OHIO

## GEARS

Spur, Worm, Bevel, Helical or Special

WE DO Surface, Grinding, Internal and External Grinding, Lapping, Spining and Bore-grinding.

We specialize in grinding hardened steel bearings, cam rollers, etc.

25 years spent in serving the machine trade guarantees quality work and prompt service.

**THE TAYLOR MACHINE COMPANY**

1919 E. 61st St.

CLEVELAND, OHIO

## CLEAR-DEEP MARKS with Thor Stamps



Thor Stamps give clear, uniform marks—for a long time. Made of special, correctly heated alloy steel. Central striking point. Easily read—easily used.

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### THE PITTSBURGH STAMP CO.

812 Canal St. • Pittsburgh, Pa.

## NAILS · RIVETS · SCREWS MADE TO ORDER IN ANY METAL



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CLAY & OAKLAND STS.  
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THE SOLID SHIM  
THAT *peels*  
FOR ADJUSTMENT



Courtesy of The Lim Manufacturing Corporation

## • maintains tight fit

"To maintain the desired tight fit at all times in our differential hanger cap," testifies LINN, "we have used Laminum shims consistently, for about 9 years. LAMINUM permits the varied adjustments necessary to compensate for wear." Write for Laminum sample.

Loading Mill Supply House carry LAMINUM shim stock.

Also a complete, conveniently packaged line of brass and steel thin shim stock, and arbor spacers.

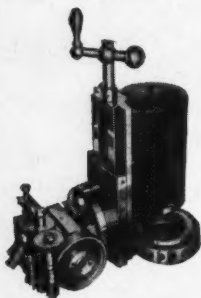
LAMINATED SHIM COMPANY, INC.  
Mfrs. . . . Long Island City, New York

## LAMINUM

Precision adjustment SHIMS

bar stock or shafts, dividing head, and so on.

When used with a lathe, the Millerette makes it possible to cut spur or bevel gears, to perform graduating and milling, surface milling, external key setting of



Millerette

all kinds, machining at angles, splining head work of the ordinary class. Used in connection with a drill press, the Millerette will, with accuracy, space the holes that are to be drilled. Work can be held in any desired position or at any angle



## DRILL THESE HOLES

By a Quick, Easy, Inexpensive Method

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS  
Wilmerding, Pa.

by rotating the Millerette on its base and setting it by the precise graduations with which it is provided. The principle used in the Millerette Dividing Head construction is that of the interchangeable gears, the same as regularly used on gear cutting machines. For divisions from 2 to 360, the index plate shows the proper gears to use and the number of turns required of the index lever. It is easy to set up and simple to operate.

The Millerette is made in three sizes: No. 4 for lathes of 9 to 14-in. swing, No. 5 lathes of 14 to 16-in. swing, and No. 6 for lathes of 16 to 24-in. swing.

## Smootharc "Harstain" Welding Electrode for Stainless Steel

The Harnischfeger Corporation, 400 W. National Ave., Milwaukee, Wis., announces Smootharc "Harstain", an electrode designed for welding such brands of chrome-nickel stainless steel as Edduro, KA-2, Allegheny Metal, Unilloy Duroloy, and so on.

"Harstain's" base metal contains 19 per cent chromium, 9 per cent nickel—higher content of both elements than in the usual 18-8 type of stainless steel. This prevents nickel and chromium content of the weld from dropping below the analysis of the parent metal. Carbon content of the base wire is below 0.05 per cent to insure high resistance to corrosion. Columbium is added to prevent carbide precipitation, the cause of intergranular corrosion.

The coating is especially designed to give the arc maximum stability and to protect metal against oxidation and atmospheric contamination. This is accomplished without the use of calcium chloride, a highly toxic chemical sometimes found in stainless steel electrodes. Manufactured in sizes from 3/32-in. to 1/4 in. in diameter, Smootharc "Harstain" is available in standard lengths of 12 in.

## "Buy Economy — You'll Effect Economy"

SOCKET HEAD  
CAP SCREWS



HOLLOW  
SET SCREWS

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from Bar

Made of  
Alloy Steel

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**COMET TOOLS**

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**Boring and Threading**

The ideal tools for  
**JIG BORING**

Now also available  
tipped with  
**Tungsten Carbide**  
**"Cutanit"**

For holes from  $\frac{1}{8}$ " up  
15 different sizes

**"Comet" Carbide Tipped Tools**

Tool Bits, Drills, Forming Tools  
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**COMET TOOLS, INC.**

29 Union Square

New York

## 3 and 4-Way Control Valves



3 and 4-Way Control Valves for operating single or double acting air, steam, water or oil cylinders. Made in lever, foot, solenoid and motor operated. All pressures up to 3000 lbs. Bulletins on request.

Other Products: Arbor Presses, Flexible Couplings, Steel and Stainless Ball Floats, Steam Traps and Separators, Air Separators, Traps and Vents, Etc.

**W. H. NICHOLSON & CO.**

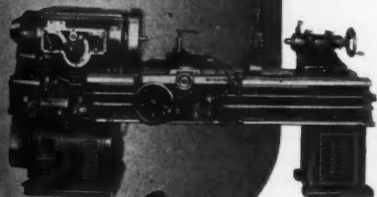
136 Oregon St., Wilkes-Barre, Penna.

*Sidney*

22 SPEED

**SLIDING SPUR TOOTH  
GEARED HEAD  
LATHES**

**WITHOUT JAW TOOTH CLUTCHES**



**T**WELVE selective speed changes with only 14 gears and without use of jaw clutches.

Furnished with either conventional threaded nose or standard "L" type tapered key drive nose.

Selective speeds engaged by three levers on front of headstock with direct reading index plate showing position of lever for all speeds.

Illustration shows 18"x8" lathe.

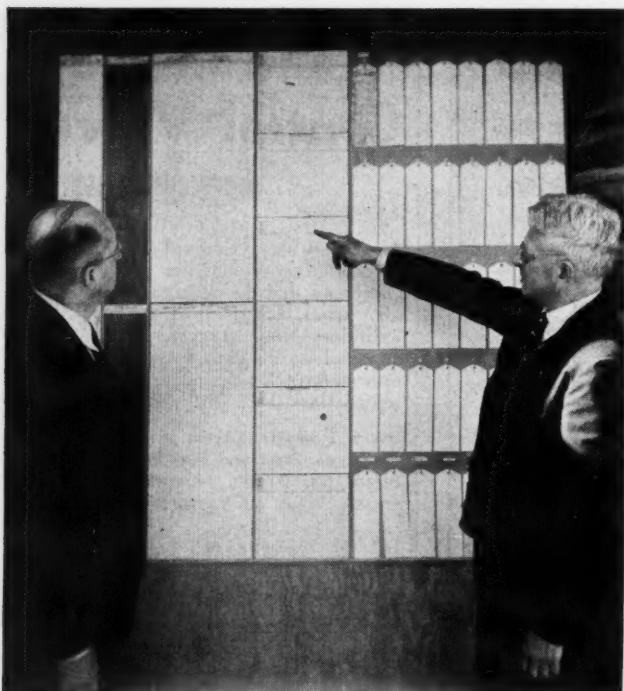
Other sizes: 14" to 36".

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**THE SIDNEY MACHINE TOOL CO.**

210 Highland Ave.

Sidney, Ohio



Molz Stock and Production Control Board

### Molz Stock and Production Control Board

To simplify the task of controlling stock and production so as to avoid shortages in the stockroom and to insure the production of parts as needed for assembly or shipment, Molz Brothers Metal Products Company, 100 N. Brand

Bldg., Glendale, Cal., has developed the stock and production control board illustrated herewith. When operated as intended, the actual amount of stock of each kind and the location in the plant is indicated on the board and can be determined at a glance.

The board as shown includes five separate units, permitting the ready addition of the separate sections to meet the demands of the business. The first two sections provide for visualized stock control, each section having a capacity of 75 stock numbers. The third section presents a visual record of manufacturing activities and sales by months, the fourth section presents the production planning, and the fifth section is the job order control covering three months' activities. The units are available separately so that a jobber or wholesaler who would be interested in only the first three sections need not purchase the other two. If desirable, the several sections may be placed anywhere instead of together as shown.

The board is 90 per cent metal and is designed to withstand the wear incidental to manufacturing operations.

### PYRO RADIATION PYROMETER



**STOP** spillage. Get exact temperature of work in furnace. Direct reading; no calculations; no maintenance expense. Strictly automatic.

Range 1000-3600° F

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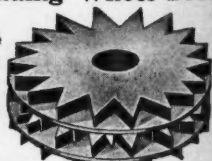
**The Pyrometer Instrument Co.**

101-105 Lafayette St.

New York

### Grinding Wheel Dressers

We make all types of Dressers and Cutters



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**DESMOND-STEPHAN MFG. CO.**

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The Canadian Desmond-Stephan Mfg. Co., Ltd.  
Hamilton, Ontario, Canada

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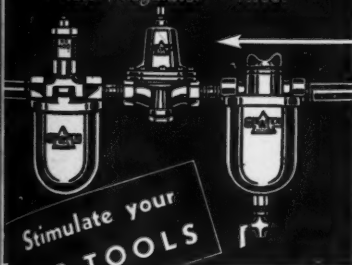
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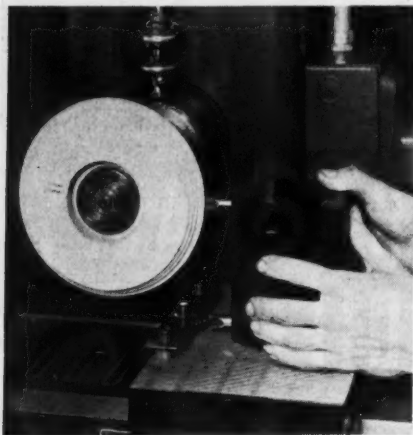
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176 EAST 131st STREET  
CLEVELAND, O.

## "Copy Cat" Grinding Wheel Dresser

Sneed Manufacturing Company, 197 Scotten Ave., Detroit, Mich., has now made available to industry in general a grinding wheel dresser which was devel-



"Copy Cat" Grinding and Wheel Dresser

oped in the Sneed plant to expedite the production of hundreds of form tools which comprise a part of the product of this firm. The feature of the wheel dresser is that it makes possible the exact duplication of a given shape of form tool at a speed which brings the cost of such tools within limitations of economy.

The tool consists primarily of a steel block carrying a diamond wheel dresser and a follower, the diamond being located directly above the follower at such a point that it can be brought into contact with the wheel at the correct loca-

tion. The movement of the follower is guided by a template made to the exact shape desired on the wheel, the follower being located so that a line drawn at exact angles to the base on which the follower block moves and touching the exposed edge of the diamond would also touch the follower. Thus when the block is set on its base and moved, all corresponding points on the follower and the diamond will be in exact vertical alignment and will follow exact duplicate patterns. Average dressing time is said to be five minutes and the average amount of stock removed when redressing a wheel, 0.005 inch.

The dresser is applicable to any type of grinder and is said to be equally efficient on rolls, dies, radii, and angles. Templates are made from 1/16-in. B & S stock and the surfaces are made smooth and square. Soft templates are used on short run jobs, but hardening is recommended if a number of pieces are to be finished.

## Hanchett Planer Type Straight Wheel Surface Grinder

Flat surfaces of comparatively large area can now be finished by grinding on the Hanchett Planer Type Straight Wheel Surface Grinder shown herewith. The design of this machine, which is a product of Hanchett Manufacturing Co., Big Rapids, Mich., is similar to that of the planer, having the planer type bed and table, column and cross rail. The machine is, however, especially designed to carry a grinding spindle and mechanism.

The working surface of the work table is 30x96 in. and the maximum clearance between a new wheel and the table top is 20 in. Forced feed lubrication is provided for the table ways. The machine is equipped with a coolant system including a welded boiler plate tank with oil

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A milling attachment for use on Lathes, Drill Presses, Shapers, etc.

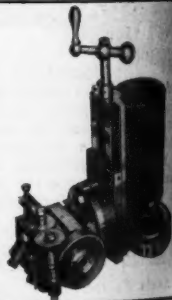
Cuts spur and bevel gears — handles milling and divisional work — key seating — angle cutting — splining — slotting. Simple, speedy and accurate. Sturdy in construction. Quickly pays for itself in shops of every size.

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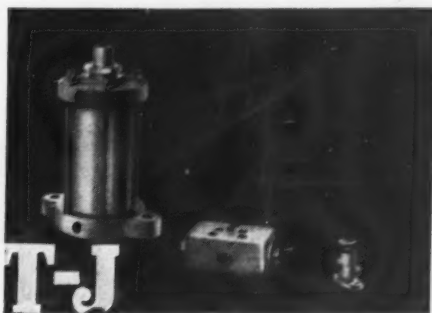
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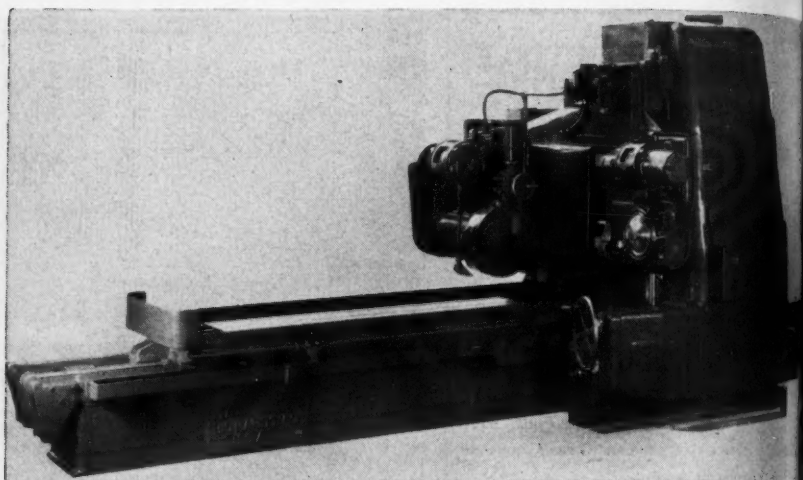
**The POWER CYLINDER**  
attaches to clutch, trip, or other actuating element. It is actuated by the power valve.

**The POWER VALVE**  
controls the application of air pressure to the cylinder to start and stop machine movements. It is actuated by one or more of the button valves.

**The BUTTON VALVE**  
controls supply of pressure to the power valve, serves as the actuating medium for the system. It is available in all required designs for simple or complex inter-locking control, for hand, foot, cam or lever operation, singly or in multiple, can be located in any desired position.

**We have prepared** detailed information (Bulletin No. 3) so that you can see how the equipment may meet your needs. May we mail it to you?

**The TOMKINS-JOHNSON Co.**  
620 N. Mechanic Street, Jackson, Michigan



**Hanchett Planer Type Straight Wheel Surface Grinder**

capacity of 250 gal. The grinding wheel is of the straight type, 20-in. diameter by 3-in. face by 10-in. hole. The cross rail is elevated by power at a rate of 5 ft. per minute. Hand clamps are provided for both main and auxiliary housing. Both automatic and hand down feeds are provided for the wheel head with an automatic cross feed in steps of  $\frac{1}{8}$  to 5 in. Constant cross feed is 30 ft. per minute.

The grinding wheel is operated by a 15 to 20 h.p., 1200 r.p.m. motor and power is supplied to the hydraulic pump by a 10 h.p., 1200 r.p.m. motor. The grinding wheel head cross feed is powered by a 5 h.p., 1200 r.p.m. high torque motor; the elevating motor for the entire cross rail assembly is 3 h.p., 1200 r.p.m., with automatic brake; the coolant pump motor is  $\frac{1}{2}$  h.p., 1800 r.p.m., and the lubrication motor is  $\frac{1}{4}$  h.p., 1200 r.p.m.,

The machine is 10 ft. 10 in. wide, 10 ft. long and 9 ft. high. Weight is approximately 45,000 lbs. net.

### Curran Portable Coolant System

A coolant system designed for use with machine tools and which can be carried about and put into service where necessary has been brought out by Curran Machine Works, 3125 45th St., Long Island City, N. Y. The outfit consists of a portable tank, feed pipe with specially designed clamp for holding it in any desired position, and a return pipe through which the coolant returns from the machine table to the tank. The coolant is supplied to the point of use by a pedal-operated pump in the tank. To obtain a charge of coolant at the point of the tool, the machine operator

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Cuts all metals any shape—  
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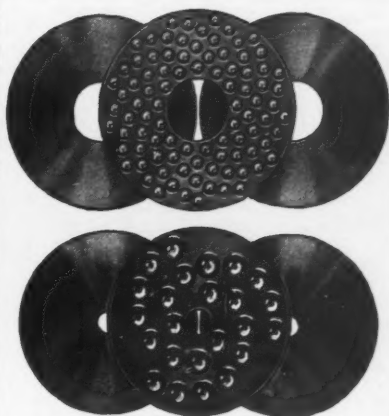


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Special Bearings Made To Order—Any quantity "one bearing or one thousand". Your present bearings duplicated. Send sketch or worn sample, regardless of condition, for quotation.

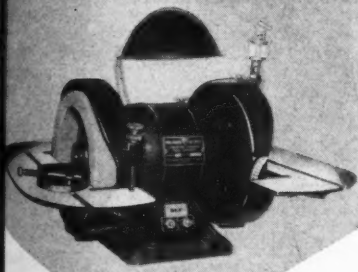
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Here's a grinder that removes metal fast when rough grinding and finish grinds smooth, keen cutting edges.

Two wheels—diamond or silicon carbide—one for rough and one for finish grinding of carbide . . . high speed and cobalt high speed steel . . . Stellite.

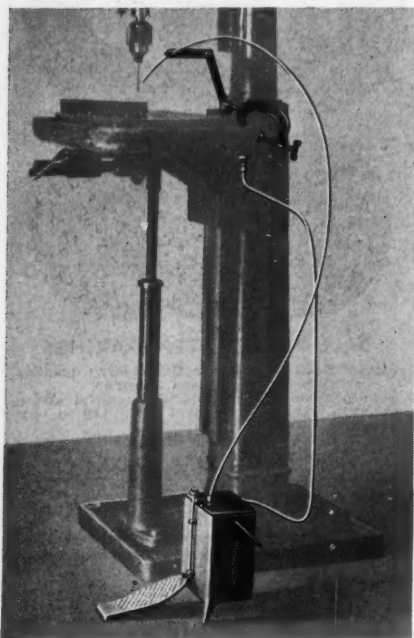
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**Thomas Prosser & Co.**

120 WALL ST. • NEW YORK

presses the pedal with his foot, forcing a supply of coolant into the feed pipe and delivering it to the tool. This method of operation leaves both of the operator's hands free to manipulate the



Curran Portable Coolant System

work and the tools. The amount of coolant delivered at each stroke of the pump is adjustable by means of a finger nut.

The device may be moved from one machine to another quickly. The only adjustment to be made consists in at-

taching the clamp to the machine table so that the feed pipe will be held in the desired position and attaching the return pipe, if necessary, to the table so that the coolant will be returned to the tank.

### Bausch & Lomb Improved Optical Protractor

An improved optical protractor for measuring and checking the exact angular relation between surfaces, edges and holes, is now being offered by Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y., for production work and tool room application.

According to the manufacturer, the instrument does the same work as the sine bar, with the advantage that it offers direct reading to replace a combination of mensuration and calculation. Equalling the 5-in. sine bar in accuracy, it avoids the accessory equipment required by the bar.

Angles to one minute of arc can be read directly off the scale, eliminating trigonometrical calculations or reference to handbooks. The protractor, which is self-contained, is small and easy to apply to jigs, fixtures, bench work and surface plates. It is useful for determining tapers, dovetails, grooves, and sloping or angular surfaces.

The base of the instrument is adjustable, making it possible to correct the protractor for inaccuracies from the true level in the bed of the machine. A micrometer center revolves, carrying with it a level and protractor scale which is viewed through an eyepiece. After turning the base, the center ring is merely revolved by hand or by the micrometer screw which acts as a fine adjustment until the required angle appears on the scale. The protractor is then placed upon the work which is turned until the level bubble becomes central.

The base is of the new design with



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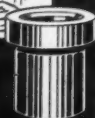
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### MODERNIZE EQUIPMENT

The **OPTO-MATIC** maintains a constant level of oil in ring or ball bearings by feeding oil when the level drops and automatically shutting off when the correct level has been restored. Equipped with concealed level adjustment. 100% foolproof.

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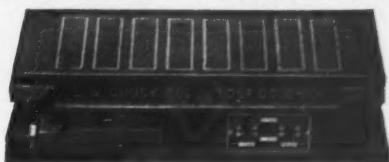
The **DRIP-DROP** is a thermal bottle oiler dropping oil on the bearing from the top exactly as needed.

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Working Surface 5 1/2" wide, 13" long.  
Consumes .5 Amp.

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A **REAL MAGNETIC CHUCK** that is adaptable for any purpose. Unconditionally guaranteed to furnish the highest magnetic holding power on either 110 or 220 volt direct current. Well designed and beautifully finished, highest quality workmanship throughout—complete with cord and plug—an outstanding value. \$45.00  
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Complete with pilot light signal, switch and cord. Operates on 110 volt A. C. current. 7 1/2" wide, 12 1/2" long, 6 1/2" high. Shipping weight 55 lbs.



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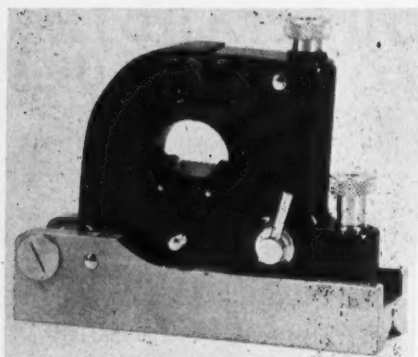
L-W also manufactures Power Saws, Lathe Chucks, Milling Machine Vises and Dividing Heads.

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## L-W CHUCK CO.

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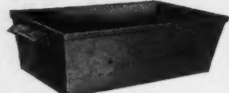
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Bausch &amp; Lomb Improved Optical Protractor.

special provision for using the instrument on round stock. For this purpose, a slotted V-base with a secondary level is provided, making measurements on round surfaces as easy as on flat surfaces. Built for hard shop work, the protractor is said to retain its initial accuracy under shop operating conditions.

### New Nesting Type Tote Pans



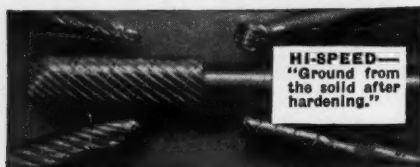
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\$1.00 each

20" long x 12" wide x 6½" deep.  
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

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**SEVERANCE MIDGET MILLING CUTTERS**  
Large stock of Standard cutters. Any shape,  
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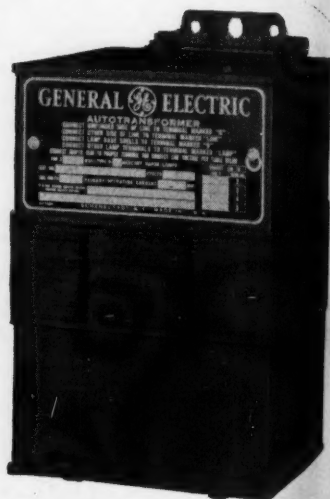
**Severance Tool Mfg. Co.**

1516 E. Genesee Ave., Saginaw, Michigan

### TuLamp Transformer

A new "TuLamp" transformer, designed to operate two 400-watt Type H mercury lamps at peak efficiency and at 90-95 per cent power factor, has been introduced by the General Electric Vapor Lamp Company, 897 Adams St., Hoboken, N. J. The "TuLamp" unit supplements the standard line of General Electric Transformers for mercury lamps. Use of the double-duty unit permits a reduction of some 20 per cent in transformer costs, and results in additional installation saving. Transformer losses are said to be reduced 30 per cent in comparison to two single-lamp units.

The new unit is 1½ in. wider and somewhat heavier than the single-lamp transformer, but is practically the same in general design. Starting currents using these transformers are below the normal



General Electric Vapor Lamp Company's  
"TuLamp" Transformer

operating current, so that no provision need be made in the wiring to take care of excess starting values. For example, starting current of the "TuLamp" transformer, operating two 400-watt Type H lamps from a 115-volt line, is 4.5 amperes, gradually increasing up to the normal two-lamp line current of 7.5 amperes. Under these starting conditions the wiring in branch circuits can be used at full capacity.

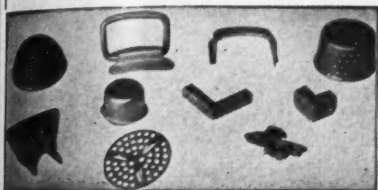
Using the new unit, one lamp starts and reaches its full efficiency before the

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MMS-6



other lamp. With as much as a 40-volt drop in the circuit, one lamp will continue to burn. Should one lamp burn out, the other lamp will operate normally without injury to the transformer.

### Taft-Peirce Universal Angle Gage

What is said to be a distinct improvement in the means of measuring and laying out angles has been introduced by the Taft-Peirce Manufacturing Co., Woonsocket, R. I., and it consists of a set of gages shown in the illustration. The set is designed to accurately produce any angle between 0 and 180 deg. by 5-minute increments. The set includes ten independent angle gages, seven of which are parallel blades with a pair of supplementary angles on each end, and three of which are triangles. All members are of tool steel, hardened and ground to such precision that the variation from

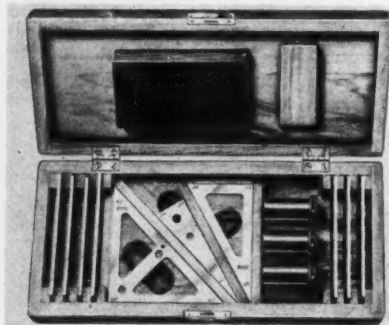


Fig. 1—A Set of Taft-Peirce Universal Angle Gages.

the exact angle of any combination will not exceed one minute.

The universal angle members are fixed in combination for convenient handling

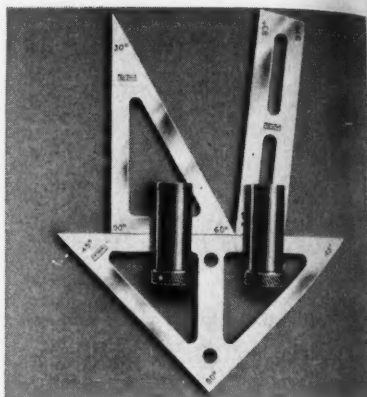
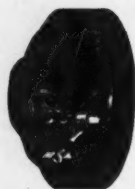


Fig. 2—Taft-Peirce Angle Gages Arranged to Produce a 36-Deg. Angle.

by the use of an ingenious clamping device, three of which are provided in each set. Figure 2 shows a combination of the angle gages set to produce an angle of 36 deg. The gages can be applied directly to the work without any obstruction and thus will be found highly useful in tool rooms, dieshops, precision manufacturing and inspection departments.

### Hunt Solenoid Air Control Valve in Small Size

A control valve for the operation of air cylinders of diameters not over 3 in. with correspondingly short strokes in  $\frac{1}{8}$ -in. I.P.T. size only, and suitable for air pressure up to 200 lbs. operating on G.E. 290-D Solenoid with low amperage characteristics has recently been brought out by C. B. Hunt & Son, Salem, Ohio. The valve can be furnished for two-way and three-way operations. The two-way



### M-D Facing Heads

#### With Automatic Feed

Can be attached to Column Boring Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically and covers faces 6" to 30".

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Center of Bore—The CORRECT Way**



Standard Length Type—for measuring the usual variety of bores. Available with length extensions for shallow, medium or deep bores.

**PISTOL  
GRIP  
TYPE**



for use in restricted quarters. Dial can be swung to any angle suitable to the operator.



**Left — Vertical Type:**  
Clear view of dial when used in vertical position.



**Right — Vertical 90° Type:** Dial viewed from end of gage.

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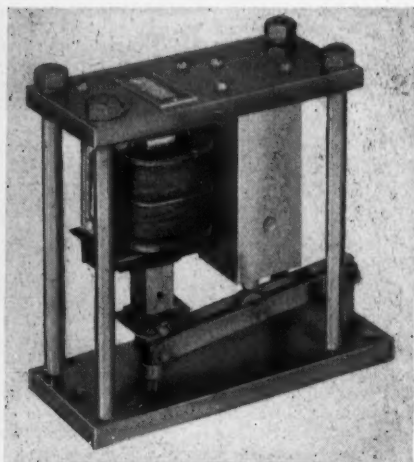
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THE GAMMONS-HOLMAN CO. MANCHESTER, CONN.



Hunt Solenoid Air Control Valve in Small Size.

and three-way valves can be supplied normally closed and normally opened.

The valve, which is one of the "Quick-As-Wink" line, employs the same no-

metal-to-metal contact valving principle as other "Quick-As-Wink" valves manufactured by this company. One feature of the new valve is that there is only one moving part—the stainless steel plunger in the valving unit. Another feature of the valve is its freedom from leakage, the design being such that an increase in air pressure tends to tighten the air seal.

The "Quick-As-Wink" valving unit used in the solenoid valve assembly is available to users who desire to develop their own methods of mechanical operation.

### Warren Pulley Cover

To eliminate belt slip on belt driven equipment, Warren Pulley Cover Company, 15 Union St., Lawrence, Mass., has developed a preparation which, when applied to a pulley, is said to eliminate slippage and consequent power losses, and increase production. Warren Pulley Cover is a synthetic leather which is applied to the pulley surface with a brush, as shown in the illustration. The cover can be applied without removing the pulley from the shaft, is applied easily and dries overnight.

It is suggested that two coats of the pulley cover be applied; the first coat will dry in approximately half an hour to a point at which the second coat should be applied to set overnight. The pulley cover can not be used where the pulley



Warren Pulley Cover is applied in the same manner—and as easily—as paint.

runs in water continuously, but is not affected by small amounts of water and the oils usually prevalent in a belt help to keep the pulley cover in proper condition and make it effective. The pulley



Flush type drives in



Low clearance type

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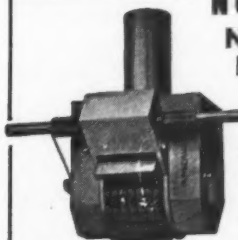
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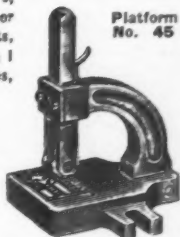
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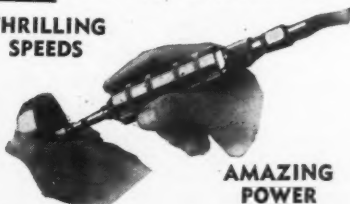
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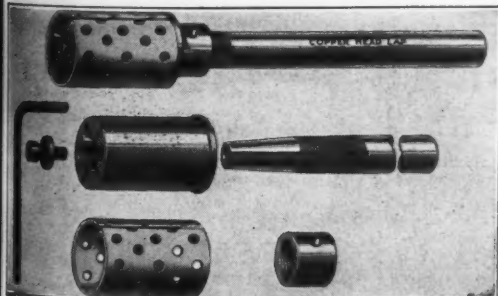
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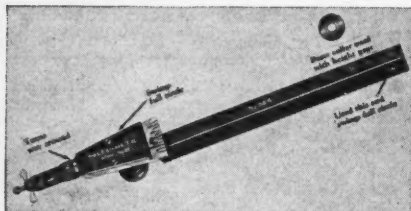


cover is used with equal effectiveness on all types of pulleys, including wood, fibre and paper.

Warren Pulley Cover is supplied in a can together with a brush for application.

### Starrett "Universal Junior" No. 564 Indicator

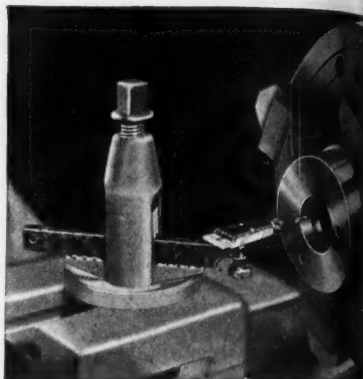
The "Universal Junior" Indicator No. 564 recently introduced by The L. S. Starrett Company, Athol, Mass., is characterized by the unusual versatility afforded by the flexibility of its design. The ball contact, for example, is frictionally held and may be set to touch the work at any desired angle. The sleeve which holds the contact point can be turned completely around, and the entire indicator can be swung through a full circle when mounted on the shank. This arrangement makes it possible to keep the graduated scale in the most comfortable and convenient position for easy reading, regardless of the operation or nature of the work. Physical strain and eyestrain are eliminated, double



Starrett "Universal Junior" No. 564 Indicator

graduated scales or mirrors are unnecessary and quick, easy set-ups are made possible.

The indicator can be mounted on the side of one end of the shank or on the



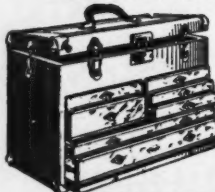
Starrett Universal Junior Indicator in Use

top of the other when used in the tool post of a lathe, or it can be removed from the shank and attached to the jaw of a height gage. Readings are made in thousandths over a range of 0.012 in. by means of a needle and graduated scale. All parts are of case-hardened steel or die cast. The indicator case is 2½ in. long, ¼ in. thick and tapers from 11/16 in. at the scale end to ½ in. at the contact point. The shank is approximately ¼ x ½ x 5 inches.

### Davis Super Micrometer Fly Cutter

Originally designed for cam and crank-shaft boring where extreme accuracy is a primary consideration, the Davis Super Micrometer Fly Cutter, product of Davis Boring Tool Co., 6202 Maple Ave., St. Louis, Mo., is now being offered for other similar uses. The simplicity of the tool is said to make it quite universal. There are only three moving parts; the adjusting screw, the serrated expanding plun-

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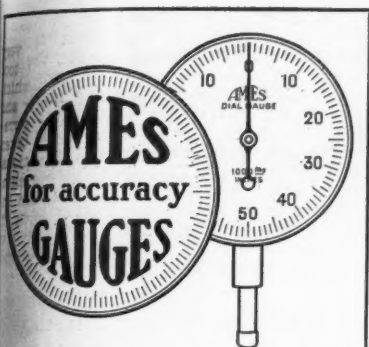


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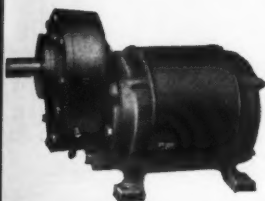


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**EXPANDING "TYPE B"**

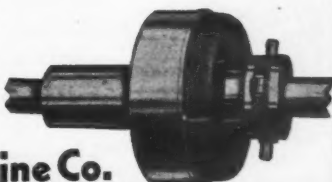
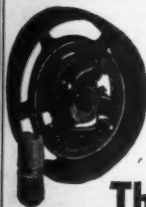
Large friction surface and simplicity of its unique design are responsible for the outstanding performance of this better built clutch. For moderate speed drives of all kinds it has no equal.

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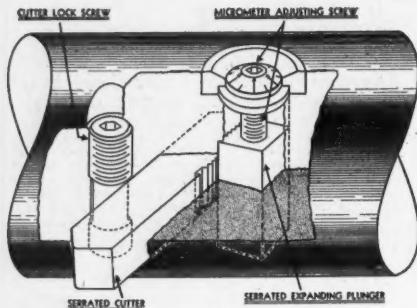
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ger, and the cutter.

The serrated plunger is threaded internally and works up and down on the adjusting screw, which is actuated from



Davis Super Micrometer Fly Cutter

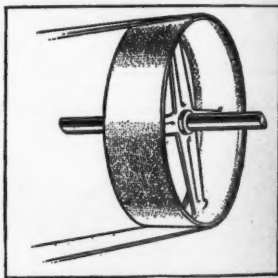
the micrometer dial at the top. The serrations on the expanding plunger mesh perpendicularly with the serrations on the cutter, and raising the plunger expands the cutter. In like manner, depressing the plunger contracts the cutter. The pitch permits the construction of a tool with an expansion as fine as 0.0001

in. per graduation if necessary.

Even though the expansion is very minute and extremely accurate, the tool in any size has quite a wide range which is available by removing the plunger and setting the cutter up to the next serration. The direct thrust of boring is taken on the hardened and ground serrations, not on the screw. This construction eliminates the possibility of slipping and inaccuracies. Plunger and cutter both fit their respective slots, with a plug fit giving the strength to resist the entrance of chips and other foreign particles.

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Pulley belt slippage is said to be prevented and efficiency of power transmission equipment increased by 20 to 30 per cent by the use of Condersite Pulley Covering, product of Condersite Corporation, Grace-American Bldg., Richmond, Va. The Condersite, which is a composition, is applied directly to the surface of the pulley, regardless of the material from which the pulley is made, and is



Condersite Pulley Covering

said to adhere so firmly to the pulley that it actually becomes a part of it. The Condersite adds gripping power to the pulley and thus prevents belt slippage. This, in turn, permits the use of looser belts with the ultimate result that less power is required, there is less wear on bearings, less cost for belt repairs and renewals, a saving on lubricants, an increase in the capacity of equipment and in the life of the machines.

### Fairbanks-Morse Convertible Gas and Diesel Engine

Fairbanks, Morse & Co. has announced a series of four-cycle, vertical, convertible Diesel and gas engines, indicated Model 36-A-8, to fill a definite need for



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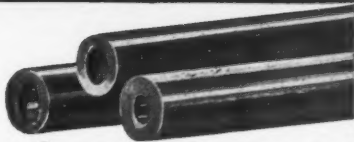
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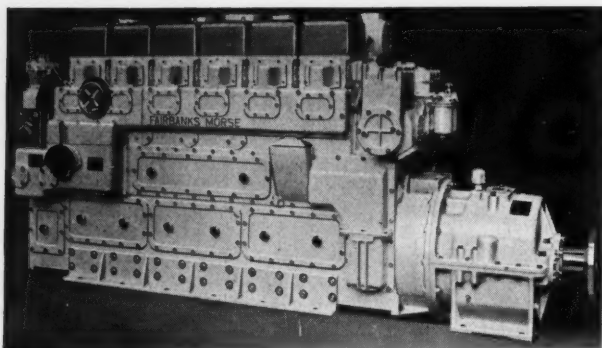
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sturdy, medium-speed engines in the 200 to 300 h.p. range. Built in both six- and eight-cylinder combinations, with 8-in. bore and 10½-in. stroke, they develop 35 h.p. per cylinder at 720 r.p.m. Smaller sizes of Model 36-A Diesel are available in ratings as low as 8 h.p.

Both Diesel and gas engines in the new 8-in. cylinder size are offered for stationary service, and the Diesels are offered for marine propulsion and in complete, unit-built Fairbanks-Morse generating sets as well. Designers were guided by the objectives of reliability and economy in service. The resulting engine is extremely simple, neat in appearance, completely self-contained, sturdy and dependable, with excellent fuel and lubricating oil economy.

Enbloc construction is employed, with individual cylinder liners, precision main, connecting-rod and camshaft bearings, and suspended or "underslung" crankshaft. Side cover-plates permit easy accessibility to main and connecting-rod bearings. The design permits double-end drive or power take-off from either end, a distinct advantage in certain types of application.

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Additional information can be obtained by writing on your business letterhead to Bulletin 3600-A-3 Fairbanks-Morse Co., 600 S. Michigan Ave., Chicago, Illinois.

## Excelsior Polishing Wheel Balancing Stand No. 98

The balancing stand illustrated, produced by Excelsior Tool & Machine Company, St. Louis, Ill., is sensitive and accurate device for balancing

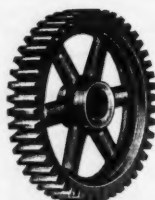
grinding or polishing wheels from the smallest size to 18-in. diameter or 14-in. width. The ways upon which the rests are hardened and accurately ground .50 tool steel inserts set into ¼-in. machined slots. This construction provides



Excelsior Polishing Wheel Balancing Stand No. 98

resistance to rough handling and assures permanent alignment.

The stand is made in two sizes: 5-in. wheel width with ½-in. clearance



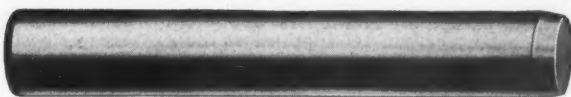
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nal information weighing 40 lbs., or be obtained for 7-in. wheel width leg on post with 7 1/4-in. clearance letterhead and weighing 50 lbs. The 3600-A-4 wheel length is 28 in. and Morse wheel height is 9 inches.



Heim Dowel Pin

### Smootharc "Harchrome" Electrode

The Harnischfeger Corporation is offering to the welding industry Smootharc "Harchrome", an electrode designed exclusively for welding 4-6 per cent chrome steel. Smootharc "Harchrome" deposits solid metal which has the same proper-

ties as the parent metal—an important factor in this field and accurate arc welding. The base metal of the electrode contains from 4-6 per cent chromium and 50 per cent niobium, the purpose of which is to heighten its resistance to certain types of corrosion and oxidation as well as to increase creep strength and resistance to impact. Manufactured in sizes from 3/16-in. diameter, for operation with currents from 10 to 200 amperes, Smootharc "Harchrome" was developed in the Smooth-

Welding Electric plant, a division of the Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wisconsin.

### Heim Dowel Pin

The Heim Company, Fairfield, Conn., is now offering dowel pins manufactured from an alloy steel and carefully heat treated and ground to a tolerance of 0.0002. The pins are available in two specifications: Group A pins are ground to 0.002 in. over the

nominal diameter for ordinary use and the Group B pins are ground 0.0001 in. over nominal diameter for use on repair work and in other places where the holes have become enlarged.

The pins are available in diameters varying from 1/8 to 3/4 in. and in lengths of from 1/2 to 4 in. The pins are fur-



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**- - with Adapter Plates for each size for holding small work.**



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nished packed in containers one dozen to the box, or can be supplied in bulk.

**Kinite Bar Stock.** This six-page folder, published by H. Boker & Co., Inc., 103 Duane St., New York, N. Y., describes the advantages and uses of Kinite Alloy Tool Steel Bar Stock. Kinite is recommended by the manufacturer for use in dies, cams, gages and other tools where abrasion and compression are important factors. Two methods of hardening Kinite—high heat of 1825 to 1875 deg. F. and low heat of 1760 to 1780 deg. F.—are presented. Instructions for annealing, forging, normalizing, and proper selection of grinding wheels and cutting lubricants are included. Copy of the folder free upon request.

**"Norma-Hoffmann Precision Needle Roller Bearings and Needle Rollers"** is the title of Bulletin No. 962 issued by Norma-Hoffmann Bearings Corporation, Stamford, Conn. The bearings described therein were originally developed for wrist pin applications in internal combustion engines of the Diesel type, where the motion is oscillating, the load heavy, space restricted, and lubrication difficult. Their success under these conditions has led to the use of Precision Needle Roller Bearings for many other difficult duties—cam rollers, planetary reduction gears, valve rocker shafts, pump shafts, idler gears—in internal combustion engines and machine tools. In general, they are for applications where minimum weight, low friction, and highly concentrated load capacity are requisites.

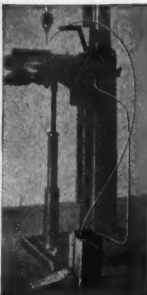
The bulletin gives complete data as to sizes, dimensions, and load ratings of complete bearings. Standard sizes of Precision Needle Rollers are also given, together with engineering information for those who may wish to manufacture their own raceways. A page of drawings of typical applications completes the book. Copy free upon request.

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in colors with a reproduction of a painting on the front cover, the presents in turn all of the various features of the lathe and explains the particular type of work for which each and type of lathe is intended. Although comprising simply a description of industrial equipment, the descriptions written in a manner which is interesting as well as educational and will give the reader a clear conception of those features of machine tool design which are for the life, accuracy, and convenience which are characteristic of modern production equipment.

The book also contains some 33 photographs, also in color, of the special accessories available for use with the lathes for production jobs, each being accompanied by a paragraph description. The last two pages of the book are devoted to drawings showing 31 tool set-ups picked at random from the many hundreds that have been specially designed by LeBlond engineers, each one making possible "Double Production Per Hour" for the lathe user. The back outside cover carries a table of specifications for the five lathes described in the text.

Copy free upon request.

**Economy Socket Screw Products.** The new set screws, socket head cap screws, stripper bolts, hexagon socket plugs, and headless cup point set screws manufactured by Economy Machine Products Co., 5216 Lawrence Ave., Chicago, Ill., are described and illustrated in a folder now being distributed by this firm. Price lists are also included. Free upon request.

**Chrome Metal** is a chrome, nickel, molybdenum alloy with a high steel used primarily for cast to shape and drawing dies. The features and advantages of this metal are explained in a four-page folder published by The Advance Machinery Company, Dayton, Ohio. Copy upon request.

**Thor Portable Electric Tools.** The complete 1938 line of Thor Portable Electric Tools is described in an attractive 48-page catalog published by The Independent Pneumatic Company, 600 Jackson Blvd., Chicago, Ill. The

which is divided into four major sections, gives complete descriptions of each type, specifications and prices on the Thor line of several type electric drills, drill bits, screw drivers, nut setters, tap wrenches, saws, hammers, chisels, polishers, sanders, heat guns and electric tool accessories. Also shown in the catalog are a variety of attachments available for use with Thor screw drivers and nut setters. These include angle attachments for operation in hard-to-reach places, attachments for driving pins and nuts to predetermined tensions, and so on.

Extensively illustrated with pictures of

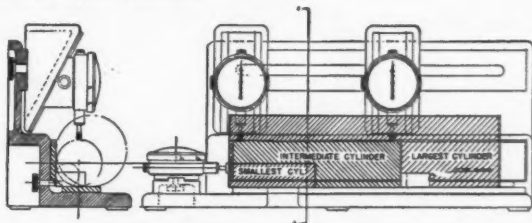
tools in operation on various types of work, as well as with pictures of the individual tools, the book has been called a helpful guide for the user of electric tools. It contains much pertinent information on the uses and construction of Thor tools.

Featured in the catalog are the Thor U14A Series of 3/16 and 1/4-in. drills, the U44 half-inch drill and the U16A Series screw drivers. Also included is the new Thor 1/4-in. "Aircraft" drill, recently developed for use in airplane construction and maintenance work.

A copy of the catalog is available to industrial executives and engineers upon request.

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Koebelite is the copyrighted name applied to the patented Koebel process of mounting small diamonds in diamond tools. This principle is incorporated in the construction of the three standard types of Koebel Diamond Wheel Dressing Tools—Multi-Point, Multi-Set and Multi-Edge—which are presented in a bulletin now being distributed by Koebel Diamond Tool Company, 1202 Oakman Blvd., Detroit, Mich. Copy free upon request.

Kinite Castings are the subject of a six-page folder which presents a number of pictures of typical castings which can be made from Kinite, a product of Boker & Co., Inc., 103 Duane St., New York, N. Y. One section entitled "Practice", is devoted to instructions on pattern making, hardening, tempering and annealing of Kinite, and to the selection of the proper grinding and cutting lubricant. Copy free.



June, 193

By Weaver

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